FEDERAL EDUCATION AND TRAINING MARKET

1990 - 1995

INPUT

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**Federal Information Systems and Services
Program (FISSP)**

*Federal Education and Training Market,
1990-1995*

Abstract

INPUT estimates that the federal government IS education and training market will decrease from $460 million in 1990 to $370 million in 1995, at a compound annual rate of -6%.

Despite agency needs, perceptions and existing dependence on contractors for IS training services, decline in this market is expected primarily as a by-product of mounting budget problems that continue to dominate the federal sector. Vendors may be able to slow or stop this downward trend. Additional marketing efforts directed at emphasizing agency needs may incite agencies to adjust spending priorities. Performance of agency missions will suffer without trained personnel resources to operate new and existing information systems.

This report contains 92 pages, including 22 exhibits.

FEDERAL EDUCATION
AND TRAINING MARKET
1990-1995

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Exhibits (Continued)

Introduction

The *Federal Education and Training Market, 1990-1995* is an issue paper addressing market needs and factors that impact the federal government's use of education and training services. These vendor services are aimed at helping federal personnel use, program and maintain information systems. This report has been developed in response to client interest in this subset of professional services provided by contractors to the federal government. The report identifies market issues and trends that impact contractors and vendors wishing to participate in this market through FY 1995. Insight into agency requirements and perceptions, as well as technology implications for vendor opportunities are examined. This report will help vendors plan their strategies to compete for federal education and training contracts.

This issue paper on education and training services provided to the federal government is one of the first in a new series of reports that are prepared as part of INPUT's Federal Information Systems and Services Program (FISSP). Reports issued through this program are designed to assist INPUT's U.S. industrial clients in planning how to satisfy future federal government needs for computer-based information systems and services. Issue papers are shorter in length than INPUT's Market Analysis Reports, but still address market issues, present agency research findings, and forecast the markets for each report subject.

The federal education and training market report's findings are based on research and analysis of several sources, including:

- OMB/GSA/NIST Five-Year Information Technology Plans for 1990-1995.

- Interviews with federal agency officials who manage and use contractor services to educate and train personnel on agency information systems.

- Federal agency GFY 1990 and GFY 1991 Information Technology Budgets.

- Federal Contract Award reporting data for GFY 1987 and GFY 1988. Complete GFY 1989 data was unavailable due to reporting difficulties with several agencies.

A
Purpose and Scope

The period covered in the report is GFY 1990 through 1995. The report is a supplement to INPUT's previous report on professional services. It is intended to present a clear perspective on the current status and future trends of vendor-provided education and training services.

For the purposes of this study, INPUT's definition of education and training services includes products and services related to information systems and services for the user, including any type of computer-aided or -based training, and vendor instruction of user personnel in operations, programming, and maintenance.

B
Report Organization

In addition to the introduction and appendix, this report consists of four more chapters:

- Chapter II contains an executive overview highlighting the major findings and issues of the report that impact industry vendors in this market.

- Chapter III presents the market forecast and other competitive considerations to vendors that participate in this market segment.

- Chapter IV addresses the main issues influencing the federal education and training market, and perspectives offered by agency personnel.

- Chapter V provides a sample of current IS education and training opportunities in the market. In addition, various appendixes are included.

C
Methodology

The OMB/GSA/NIST Five-Year Plan analysis for the INPUT Procurement Analysis Report was reviewed to target agency respondents. INPUT also researched agency long-range plans for GFY 1990-1995 to identify significant spending changes and to develop further insights into agency directions for education and training services.

The questionnaire developed to interview agency officials is included in Appendix F. It was designed to acquire information about current experiences, preferences, plans, issues, and trends about future use of contractors in this market segment.

Federal agency officials selected for interview for this issue paper included:

- Contract officers
- Program managers
- Directors of agency training services

OMB Federal Contract Reporting Center data for GFY 1987-1988 was reviewed to identify vendor market participation.

II
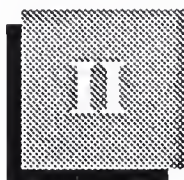
Executive Overview

Who is educating federal personnel on the use and maintenance of the federal government's information systems? The main thrust of this issue paper explores this question and the impact of technology on how these services are provided. It also analyzes other issues affecting this market.

A
Prevailing Market Conditions

Most of the requirements for information systems training are currently met by contractors. Exhibit II-1 lists prevailing market conditions. INPUT's sample of federal agencies revealed that contractors provided training for 80% of agency information systems. Agencies justify using contractors because of interrelated factors: agencies have a shortage of in-house technical personnel, but no shortage of new technologies requiring corresponding technical expertise. Lower pay scales and the political environment of agency employment are often not as appealing as careers in the private sector.

EXHIBIT II-1

Current Market Conditions

- Strong reliance on contractors

- Equal use of standalone and integrated procurements

- Technologies not instrumental as delivery vehicles

Vendor-provided information systems (IS) training is procured either with associated systems procurements for hardware and/or software, or as standalone service procurements. This indicates that vendors should not limit the vehicle for training product offerings, but rather be open to fulfilling agency training requirements through either type of acquisition and a variety of product offerings.

INPUT expected that some newer technologies, such as video training and computer-based training would have been in the forefront of training vehicles used to teach use and maintenance of information systems. Surprisingly, almost half of the respondents said traditional classroom styles of instruction were the most successful training vehicles. Instructors can easily interact with students and refer to agency examples and applications. New technologies were viewed as mere adjuncts or teaching aides to the traditional classroom method of instruction.

B

Market Forecast

Unlike most federal market segments that INPUT tracks, the federal market for IS education and training services will actually decline over the next five years, as is illustrated in Exhibit II-2. Expenditures in FY 1990 of $460 million will decline to $370 million in FY 1995, at a compound annual rate of -6%. Although the decline is due to a number of factors, severe budget constraints appear to be driving this market's decline. Also, annual confrontations between the administration and the Congress, regardless of the outcome, tend to delay training plans.

EXHIBIT II-2

Education and Training Market Forecast
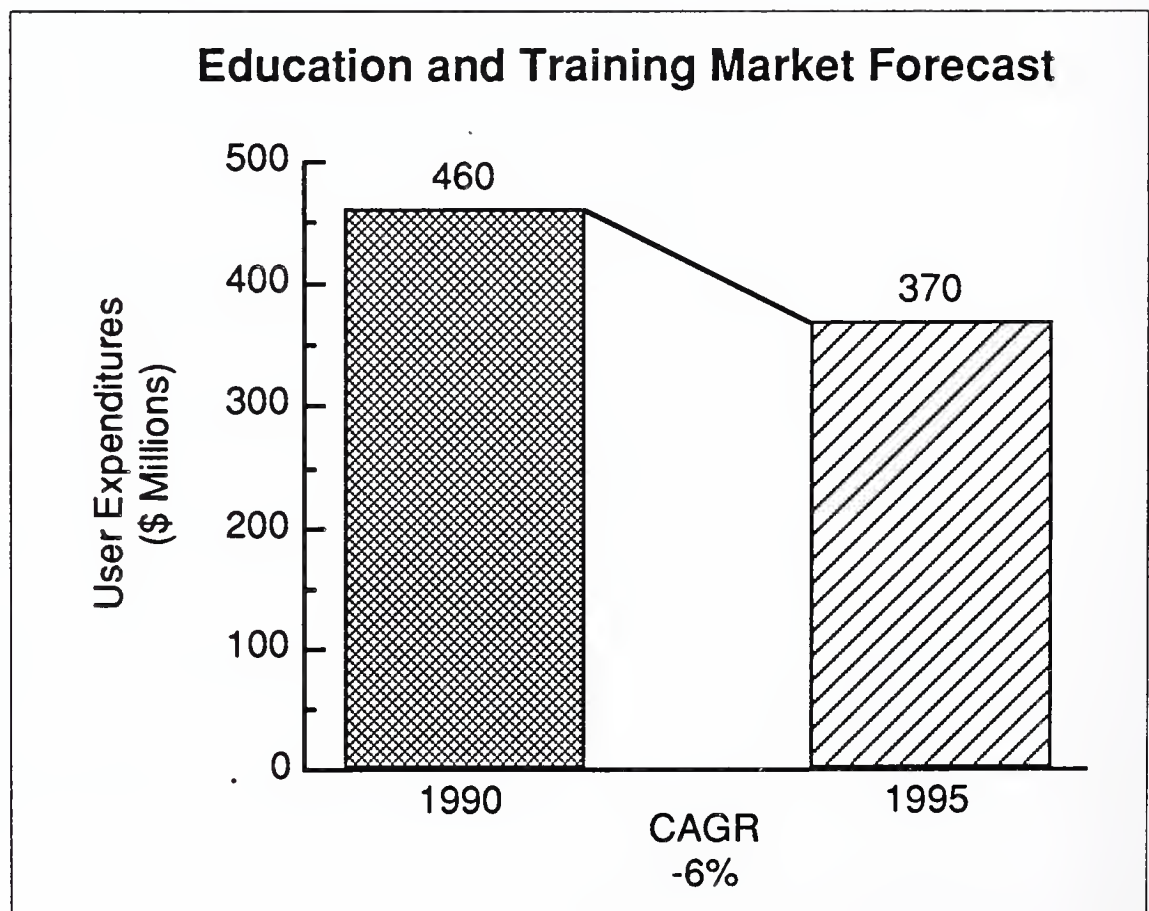
The major reason behind INPUT's forecast of decreasing federal expenditures for IS training is the decline in anticipated funding as a result of increasing budget deficit problems. Although agencies recognize the need for increased IS training services, they find it increasingly difficult to obtain necessary funding. Continually faced with a diminishing technical workforce, and with few training dollars available to retrain existing personnel, agencies may have to either trim their mission functions, or contract out more IS services.

C
Major Vendors in the Market

The top four contractors in the federal IS training market for GFY 1987 and GFY 1988 are listed in Exhibit II-3. The dollars reported reflect contract award values, not vendor revenues. The contractors are two hardware vendors and two systems integrators.

EXHIBIT II-3

Top Four Contractors—IS Education and Training Services FY 1987-FY 1988*

Contractor	Contract Award Values		
	FY 1987 ($ Thousands)	FY 1988 ($ Thousands)	Total ($ Thousands)
Unisys	39,221	14,924	54,145
Honeywell	15,505	8,142	23,647
Grumman	8,577	12,043	20,620
EDS	15,071	3,920	18,991

Source: Pinpoint Data Base Service Federal Contract Awards, GFY 1987-GFY 1988

Unisys and Honeywell won contracts to provide training on their respective hardware systems. The figures for Grumman and EDS reflect contract awards based on their roles as systems integrators. The records are not clear about whether subcontractors may have been employed to deliver IS training.

D
Recommendations

Federal expenditures for IS training services from contractors will continue to decline steadily through FY 1995 and beyond. Contractors should take several actions to retain their presence in this market as listed in Exhibit II-4. Contractors currently offering these services should expand their service and product offerings to capture available market share. Additional marketing efforts that emphasize agency needs for IS training may influence agencies to readjust their spending, and slow this market's decline.

EXHIBIT II-4

Recommendations

- Improve or develop market presence

- Cultivate positive recognition

- Develop creative pricing strategies

- Federalize course content

- Engage in vendor alliances

Contractors would also benefit from improving their public relations with agencies. Associations that deemphasize normal corporate profit motivations should be increased through participation in the Trail Boss Program and in trade organization functions. Contractors with "positive" reputations will be more likely to win contracts in the federal market.

Agencies recognize the need for more IS training, but continue to face funding problems. If vendors offered bargain rates or bulk discounts or similar creative pricing on training services, agencies would be able to lower their training costs per employee and train more employees.

Courses containing federal content will have more relevance and consequently should accelerate learning curves. Agencies will prefer vendors that include federal jargon and examples in their course content.

Vendors can increase their presence in this market by engaging in teaming and subcontracting relationships with other contractors. Prime contractors often use the services of other vendors to fulfill the training portions of their contracts. Opportunities for subcontractors should rise as agencies face greater demand for IS training and incorporate IS training requirements into support, services and other types of contracts.
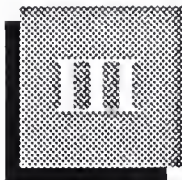
Market Analysis and Forecast

This chapter discusses INPUT's market forecast, vendor market participation, and factors impacting market conditions, and offers recommendations for vendors in this market.

A
Market Forecast

Unlike most federal market segments that INPUT tracks, the federal market for IS education and training services will actually decline over the next five years, as illustrated in Exhibit III-1. Sales in FY 1990 of $460 million will decline to $370 million in FY 1995, at a compound annual rate of -6%. This decline is due to a number of factors (most of which will be discussed in other sections of this report):

- In times of severe budget constraints, training and travel are usually the first items to be cut.

- As more technical functions are contracted out, the number of federal personnel requiring technical training is gradually declining.

- To the extent that agencies choose training methods other than the traditional classroom approach, unit training costs decline sharply.

- Despite training being mandated by the Computer Security Act, most agencies have provided little or no security training for their personnel.

Should the federal budget picture improve, federal use of training will likely increase, since the surveys showed that the demand is clearly there and most agencies still prefer the traditional (but expensive) classroom method of training. However, INPUT does not expect this to happen within the next five years.

The major market factors that are expected to influence the demand for

EXHIBIT III-1

Education and Training Market Forecast
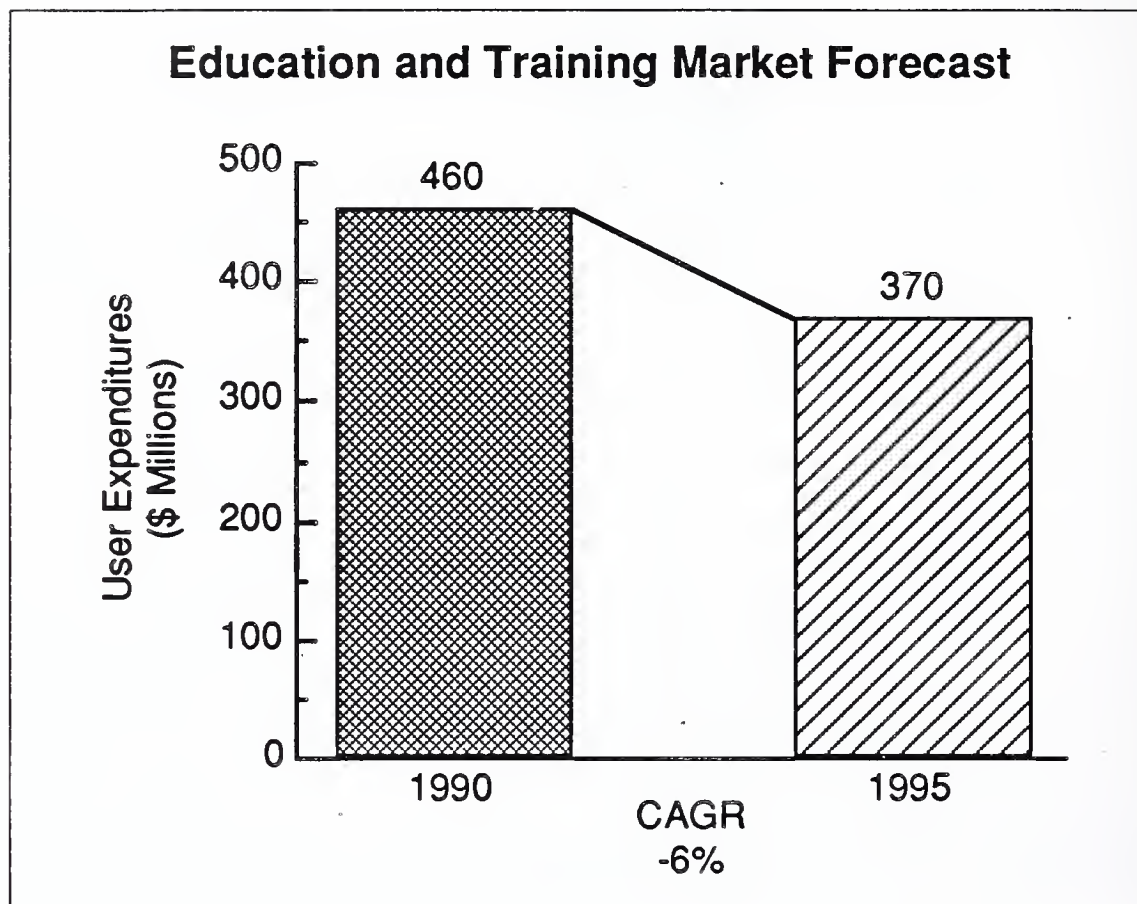
B

Major Factors Impacting the Market

The major market factors that are expected to influence the demand for contractor-supplied IS training are listed in Exhibit III-2. Three-quarters of the responding agencies in this study expected their needs for IS training to increase dramatically by almost 75%, over the next five years. Overall increased computerization within the federal sector will be the major impetus creating more IS training requirements.

EXHIBIT III-2

Factors Affecting the Market

- Increasing computerization

- New technology

- Federal staffing crisis

- Budget problems
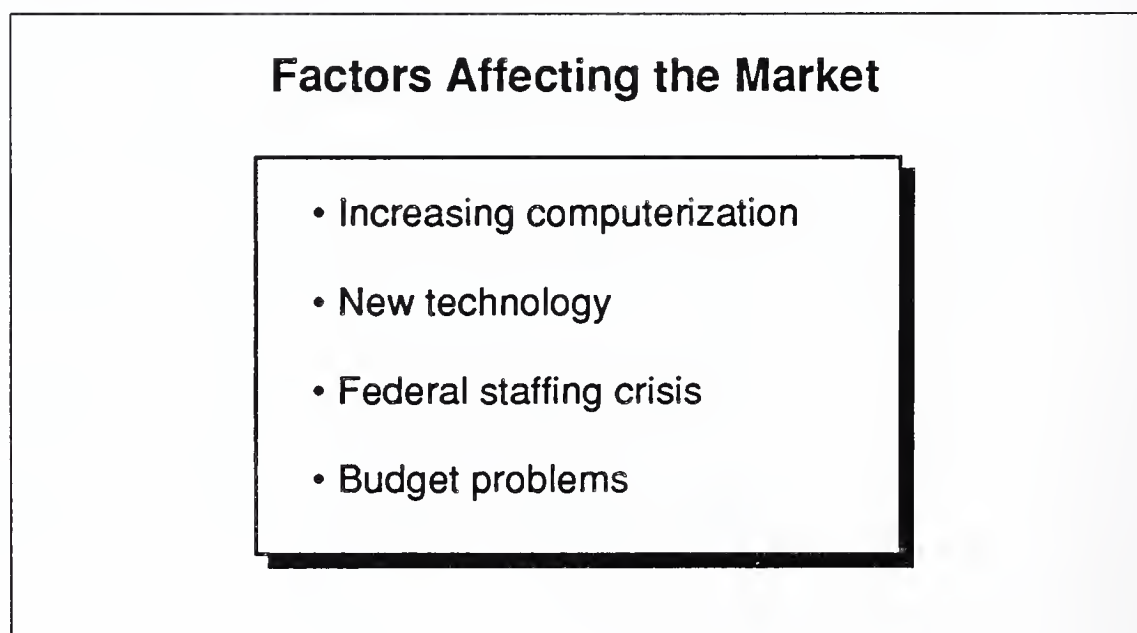
Expansion of existing systems to more end users, hardware and software upgrades, and new forms of technology such as image systems are fueling the need for additional IS training programs for users and systems support personnel.

Already agencies are forced to rely on contractor assistance to train the majority of their personnel. Current dependence on contractors to provide IS training is also expected to increase, based on projections of future federal training needs. A report entitled "Civil Service 2000," recently issued by OPM, cites retraining of existing IS personnel and other workers as the primary avenue open to the government to solve staffing requirements in the near future. Agencies must develop programs to better utilize the work force they have by retraining it to develop new and polish old skills. The national work force is only expected to grow by 1%, and with their less competitive pay scales, federal agencies will be even less able to attract qualified technical personnel.

The federal government continues to face a mounting budget deficit crisis. Viewed as non-critical, expenditures such as training and travel will increasingly be limited. Funding problems are not expected to abate in the near future. Although agencies will feel increased pressure to provide more IS training, budget requests for these services will have difficulty obtaining approval.

C
Leading Vendors

Identification of the top vendors providing education and training services for information systems in the federal market was not a clear-cut process. Vendor market presence was determined by examining the Federal Contract Award Database for specific fiscal years. The data used to determine vendor market share for the education and training subset of professional services provided only partial answers. Variances and irregularities in agency reporting procedures, and the codes under which agencies report data, cause incomplete tracking of contract award data. Infomation systems training services can be funded with appropriations from other expenditures. When this occurs, contracts may be recorded using codes corresponding to the original appropriation. In addition, FY 1989 data was not available at the time this report was written.

However, some conclusions can be drawn by reviewing GFY 1987 and GFY 1988 data for both contract awards that included training for ADP systems and services, and training services that were contracted separately. Both Unisys and Honeywell, known chiefly as hardware providers, are also major suppliers to federal agencies of education and training on their systems, as is shown in Exhibits III-3 and III-4. Systems integrators and professional services firms also seem to have won a number of contracts to provide education and training services.

EXHIBIT III-3

Top 10 Vendors— Education and Training Services for Information Systems,* FY 1987

Rank	Company	Contract Award Value ($ Thousands)
1	Unisys	39,221
2	Honeywell	15,505
3	EDS (GM)	15,071
4	Applied Learning	9,199
5	Grumman	8,577
6	Syscon	5,920
7	PRC	3,964
8	SRA	1,170
9	Harris	1,053
10	DEC	914

*Source: Pinpoint Data Base Service, Federal Contract Awards, GFY1987, 8/90

EXHIBIT III-4

Top 10 Vendors—
Education and Training Services
for Information Systems* FY1988

Rank	Company	Contract Award Value ($ Thousands)
1	Unisys	14,924
2	Grumman	12,043
3	Honeywell	8,142
4	PRC	4,447
5	EDS (GM)	3,920
6	Syscon	3,108
7	IBM	1,926
8	Harris	1,538
9	Boeing	1,318
10	Martin Marietta	1,293

*Source: Pinpoint Data Base Service, Federal Contract Awards, GFY1988, 8/90

One significant difference between the data reported for both years is that the contract award values for each vendor appear to be lower in GFY 1988 than reported in GFY 1987. INPUT believes this results from more competition in the market. This trend should continue in future years, as established vendors expand their products and services, and more education-niche contractors scramble for market share.

The top ten contractors for IS education and training services for GFY 1987 include:

1. Unisys

Unisys, formed by the combination of the Sperry Corporation and the Burroughs Corporation, is primarily known as a manufacturer of systems, ranging from high-performance mainframes to microcomputer-based systems. Unisys also offers a wide range of information technology services that includes educational services in support of its business divisions.

All federal business is conducted by the Federal Information Systems Division, including educational services for information systems. The company's education centers provide educational services to both commercial and government clients.

2. Honeywell Federal Systems

Honeywell Federal Systems Inc. (HFSI) has been a provider of information systems solutions and services to the federal government for more than 30 years. HFSI supports its customer base from its headquarters in McLean, Virginia, and from 30 field locations in the United States, Europe, and the Far East.

HFSI offers education services either at the customer site or at the company's Education Center in Reston, Virginia. Approximately 85% of HFSI's training is dedicated to formal classroom instruction. In response to increased demand for computer-based training (CBT), HFSI offers a wide variety of CBT courseware, including interactive video-disk and computer-assisted tutorials. HFSI has supported government interest in cost-effective training by increasing non-proprietary course offerings—Ada, relational data base, UNIX, A/UX—in CBT courses available for use on personal computers or resident on mainframes using the UNIX operating system.

3. Electronic Data Systems (EDS)

EDS, founded in 1962, is one of the largest information technology services companies in the world. Its experience ranges from designing and integrating large-scale information processing services to supporting them through training and facilities management contracts. Its Federal Government Group offers information management, systems integration, training and training development, and communications support services to federal, state, and local government markets.

Throughout the history of EDS, training has played a major role in the company's growth. EDS employs more than 700 training and education specialists in its Technical Development and Leadership and Professional Development training divisions. These individuals are experienced in using a variety of training methods ranging from formal classroom

training to interactive videodisc instruction to distance learning method-
ologies.

EDS provides a wide range of training services for its customers. This
includes needs analysis and consulting; curriculum design and develop-
ment; instructional design and development; training implementation;
training evaluation; training revision and maintenance; vendor training
contracts, maintenance, and administration; and training support services.
As technology expands in the information services field, EDS continues
to incorporate new training technology into its training programs.

Alliances with companies such as Videostar and Westcott, providers of
satellite communications and training services, and Behavior Tech (a
division of Thomas Group), help position EDS as a leader in technologi-
cally advanced training delivery systems.

EDS' experience in training, information management, systems integra-
tion, and communications offers a total services approach to meeting its
customers' diverse training and information processing needs.

4. Applied Learning International, Inc.

Applied Learning International, Inc. was formed from the merger of four
training companies: Advanced Systems, Inc., DELTAK Training Corpo-
ration, Spectrum Training Corporation and Interactive Training Systems.

Applied Learning, considered one of the world's largest corporate and
government training resource companies, has 81 locations worldwide.
The company addresses workforce readiness problems through its ex-
panding library of training courseware and custom-designed solutions.
Its client services are not limited to IS training, but extend to a wide
range of industries, occupations and basic educational skills.

The company has been a leader in developing technology-based
courseware that utilizes interactive video instruction (IVI), computer-
based-training (CBT), and linear video tape (LVT) instruction. Instruc-
tor-led training is also available.

5. Grumman Data Systems (GDS)

Grumman specializes in providing professional and systems integration
services to a variety of civil and defense federal agencies. GDS has
considerable experience in software and hardware engineering, computer
graphics, networking, supercomputers, high-level systems architecture,
and machine intelligence and correlation.

Grumman's information and other services segments include data sys-
tems operation, space station program support, and refurbishment and

launch preparation of the space shuttle. They also include services and maintenance of flight simulators and trainers, and support of Grumman aircraft. GDS educational services provided in conjunction with its information systems contracts are given at the customer's site or at a GDS location. Subcontractors are sometimes used to deliver specialized education. Although formal classroom instruction is the norm, GDS also uses video and CBT methods.

6. Syscon Corporation

Syscon Corporation, a subsidiary of Harnischfeger Industries, focuses on systems development and facilities management services as primary business areas aimed at the DoD. Systems integration, software products, turnkey systems and processing services are also offered to clients. The company has recently redirected much of its marketing effort to the commercial and state and local government markets in response to Defense funding cuts.

Unlike most of the other vendors discussed in this section, Syscon's contract awards were primarily for developing training systems that utilize new technologies such as CBT, simulator, and video forms of courseware. Most courseware is developed for other vendors' systems.

7. Planning Research Corporation (PRC)

Planning Research Corporation, founded in 1954 and headquartered in McLean, Virginia, is considered a leading professional services and systems integration contractor. In 1986, Emhart acquired PRC and a year later Advanced Technology, Inc. In April 1989, Emhart allowed itself to be acquired by Black & Decker Corporation. Black and Decker, after unsuccessful efforts to sell both PRC and ATI, has now decided to merge the two companies. The new company name, PRC Inc., will be effective January 1, 1991.

PRC has traditionally handled the training portions of its contracts through classes taught by PRC personnel. Occasionally, PRC subcontracts these services to disadvantaged businesses, or to vendors who specialize in specific technologies.

8. Systems Research and Applications International, Inc. (SRA)

SRA's primary business thrust has been to provide services related to systems analysis, development and engineering, computer systems, emergency response, and software products to the federal government. In response to changes in the federal market, the company has redirected some of its marketing efforts at the commercial sector. SRA is well recognized as a systems integrator of logistics, command and control,

and telecommunications systems. The company has also been a pioneer in Ada development efforts and in artificial intelligence.

Training associated with federal contracts is conducted at customer locations, or at the company's demonstration and training facility in Arlington, Virginia. Both instructor-led classes and computer-based training modules are available from the company.

9. Harris Corporation

Harris Corporation has been and continues to be a major vendor of information processing, communications and semiconductor systems and services to both commercial and government sectors. Harris is well known as a supplier of high-performance superminicomputers, supermicrocomputers, peripherals and software.

The Harris Electronic Systems Sector markets customized systems to meet military, airborne, and spaceborne needs. All training associated with these systems is developed, managed, and conducted using Harris personnel.

10. Digital Equipment Corporation (DEC)

DEC, often considered the world's second largest computer manufacturer, offers a wide range of general purpose hardware, from personal computers and workstations to high-performance VAX clusters. DEC also offers its customers peripheral equipment and support software, and systems analysis, field service and training services.

Training associated with its hardware and software products is provided to both commercial and government customers through DEC's Education and Training organization. DEC offers both instructor-led and self-paced options. The former includes lecture/lab, seminars, and text- and video-based instruction. Self-paced instruction includes computer-, text-, and audio- and video-based formats. Education and Training also develops customized training courses to meet special customer needs.

Digital estimates that approximately 70% of its federal contract training services are given in instructor-led classroom settings. The remaining 30% utilize self-paced options. In addition to training federal customers directly, DEC also trains prime contractors on DEC systems.

DEC has already been successful in using satellite communications to provide internal training to employees. The company has recently announced its Digital Customer Video Network to bring similar training options to its customers. Currently, aggressive marketing efforts to sell the DCVN subscription services are directed at the Census Bureau, Navy, and Treasury.

The following additional vendors made the top ten list in FY 1988:

Boeing Computer Services

BCS is one operating division of seven in the Boeing fold. The Boeing Corporation was founded in Seattle in 1916, and is now a diversified aerospace company with approximately 153,000 employees. BCS was founded in May 1970, and has over 12,000 employees. Most of its workers provide dedicated support to the parent company. Its major role is integration of large-scale complex information and telecommunications systems. Currently, more than 25% of BCS' revenue is derived from the federal sector. BCS offers network, distributed processing, systems operation, consulting, and education and training services, as well as packaged software products. BCS also provides other Boeing divisions with computing and telecommunications support. BCS is currently trying to sell its remote computing facilities.

The education and training division within BCS provides both custom-designed and off-the-shelf training and materials to support contractual obligations. Subcontractors are only employed when it is deemed more cost-effective, or a level of specialization is required that is not available among BCS personnel.

International Business Machines (IBM)

IBM's federal business is now conducted through its Systems Sector Division (SSD). IBM's federal organization has been in existence for approximately 33 years.

The new Systems Sector Division continues to principally pursue SI contracts as a prime contractor, as it did when it was called the Systems Integration Division (SID). SSD also functions as a subcontractor to other contractors in other federal projects.

Educational services included in SSD's contractual obligations are provided as standard catalog courses, but non-standard courses are developed by SSD or subcontracted to other vendors as needed.

Martin Marietta Information Systems Group

Recently formed by the internal merger of Martin Marietta Data Systems and Martin Marietta Information and Communication Systems companies, Martin Marietta Information Systems Group (ISG) provides full-service information systems and telecommunications support to its diverse client base in government and commercial business sectors. The group's activities include the design, integration, and servicing of a broad range of information management and systems engineering; professional information systems services and facilities management; and combining

communications and information processing for command, control, communications, air traffic control, simulation, telecommunications, and integrated communications networks.

Training support services provided by Martin Marietta ISG to its customers are usually in conjunction with a systems integration or professional services contract. Locations and instructional methods are normally customer-driven, with most courses typically taught at customer locations. Martin Marietta also has corporate training centers available which can accommodate most types of training media and instructional requirements. Although instructor-dominated classroom settings are more common, Martin Marietta ISG uses video- and computer-based training (CBT) vehicles when appropriate.

D
Recommendations to Vendors

Federal contracts for technical training on information systems will continue to decrease. Contractors must take steps to maintain or strengthen their presence in this declining market using both direct and indirect methods, as shown in Exhibit III-5.

EXHIBIT III-5

Recommendations to Vendors

- Federalize course content

- Lower course/seminar prices

- Improve recognition through GSA and trade organizations

- Engage in vendor alliances

- Use alternative marketing strategies

Contractors who federalize, or customize their courses for the federal market, will be preferred by agencies to provide more training than others in the market. Course content that includes examples from attendees' work environments always has more relevance and consequently should accelerate learning curves. Courses should be tailored to use general federal language, and in some cases modified for specific agency missions to accommodate federal training requirements for large numbers of employees.

Bulk discount rates, or similar creative pricing strategies that would lower training costs per employee, might encourage more course attendance.

Vendors need to improve their public recognition and increase their communications with agencies through trade organizations and through greater participation in the Trail Boss and the Trail Boss-2 Programs aimed at program managers. Participation in not-for-profit activities facilitates positive recognition of vendors by agencies, and helps improve chances of winning contracts.

Vendors can strengthen their presence in this market by engaging in teaming and subcontracting relationships with other vendors. Much of the IS training acquired by federal agencies is provided in conjunction with large systems integration contracts and "umbrella" contracts that are department-wide acquisitions for hardware and software. More IS training services will also be provided in systems operations contracts, as agencies find alternative ways of obtaining training services from vendors. Vendors in this market should improve their vendor alliances to maximize contract opportunities. Since prime contractors may not always possess the necessary skill-sets to provide IS training services, primes frequently employ other vendors to provide these services.

Alternative marketing strategies will also promote agency purchases of IS training services. Vendors must aggressively demonstrate to agencies that spending for education services will improve personnel productivity. Vendors should stress new technologies that are more cost-effective in reaching large training populations.

IV
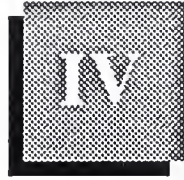
Agency Requirements

A

Agency Use and Preferences

During the past several years the federal government's information systems have undergone extensive equipment and software modernization. Additionally, manual workflow processes were incorporated into the computer processing stream, resulting in computerization of many mission function elements.

Increased computerization at federal agencies increased demands for additional personnel trained to operate and maintain government information systems. Federal computer hardware now includes all classes of mainframes, midsize systems, and microcomputers. Systems use will continue to escalate as more processes are automated and improved for agencywide implementation.

Training for federal personnel can be divided into two categories: user training, and technical personnel IS training on development and maintenance. As information systems' accessibility and use is extended to more federal end users, the level of user sophistication becomes progressively less, and demands for user training correspondingly increase. Budget problems and the inability to compete monetarily with the private sector to recruit new and retain existing technical personnel present real problems to federal agencies faced with mounting information processing needs. Federal agencies find themselves without the technical expertise needed to implement—and maintain—new technology. It is often less expensive to employ contractors on a need basis than to maintain a cadre of in-house technical personnel.

Agencies had little choice but to use contractors to assist in providing their information systems training requirements. Agencies interviewed in INPUT's recent study estimated that contractors provided training for approximately 80% of their information systems, as shown in Exhibit IV-1. Agencies have found it increasingly difficult to compete with the private sector for recent technical graduates or experienced personnel. Lower pay scales, and the political environment of agency employment

are often not as appealing as careers in the private sector. This is especially true in major metropolitan areas. Many long-term agency personnel are also being lured to work for private corporations.

**Agency Information Systems
Using Vendor Services
for Education and Training**

20%
Don't Use
Services

80%
Use Vendor
Services

Average Percent
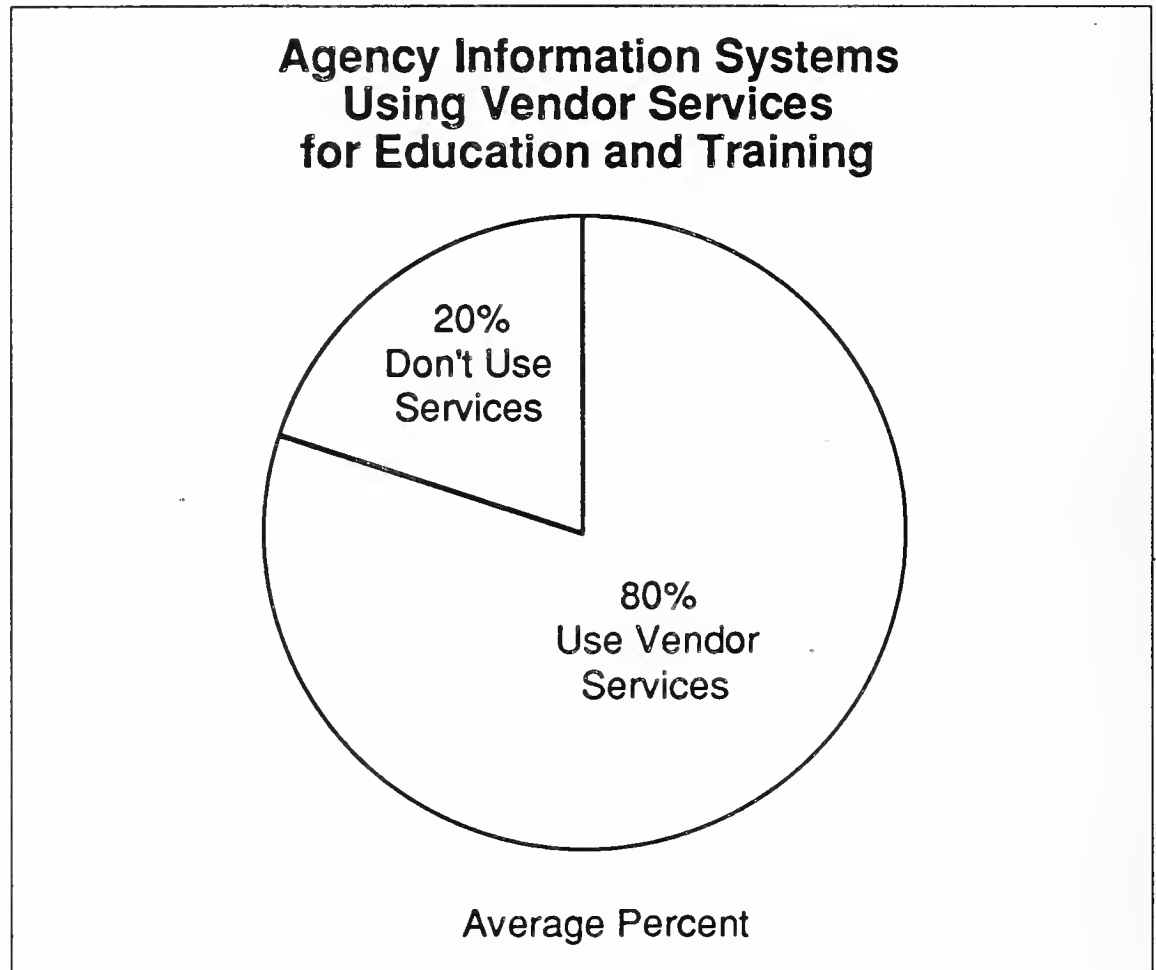
Agencies also use contractors to provide ongoing IS training, as shown in Exhibit IV-2. Respondents estimated that over 60% of their services were ongoing, versus approximately 40% for initial training only. System upgrades, high personnel turnovers, and the general inability of the government to retain qualified technical personnel have been driving the government to rely on contractors to provide ongoing training services for federal information systems.

EXHIBIT IV-2

Contractor Education and Training Services for Information Systems— Initial versus Ongoing Services

38% Initial

62% Ongoing

S e r v i c e s

Average Percent of Services
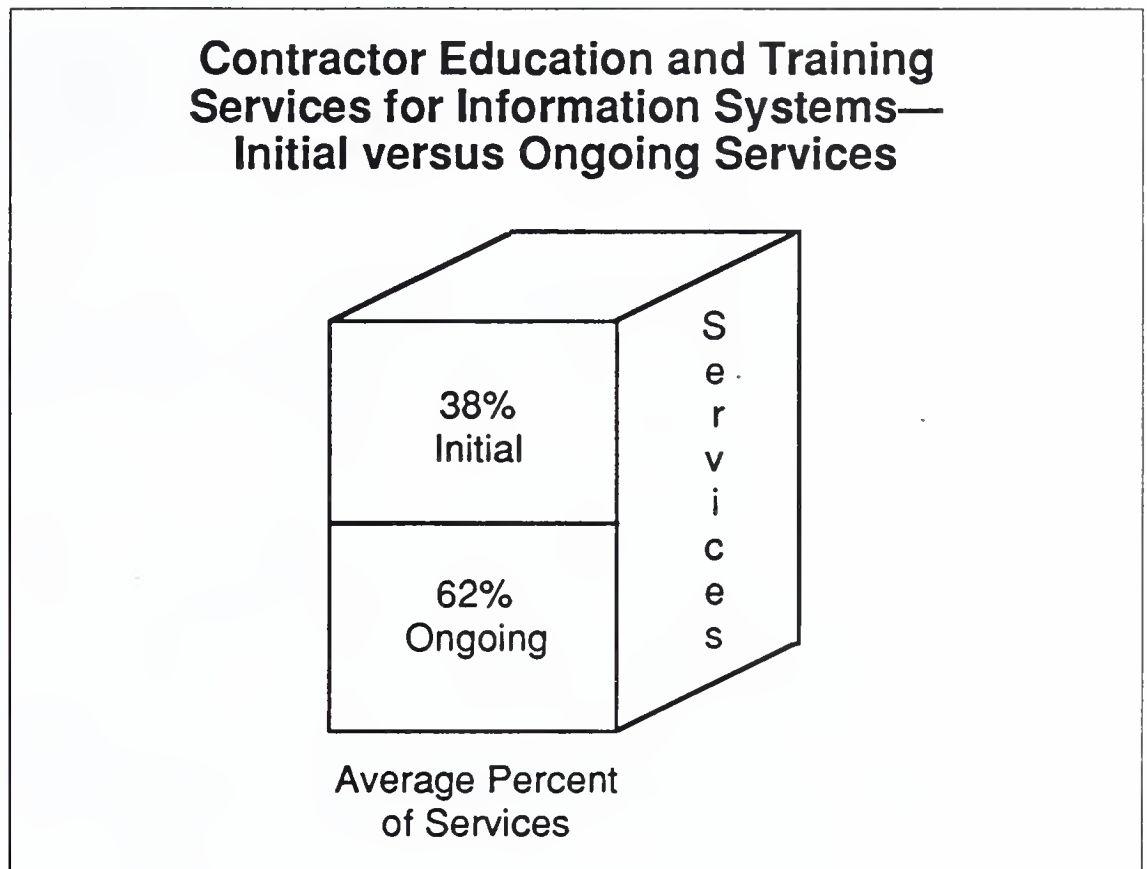
Agency respondents were asked what types of training they expected to purchase from vendors for four classes of information systems:

- General ADP
- Specialized (scientific and engineering)
- Office automation
- Image management systems

A comparison of respondents' average frequency ratings for services is presented in Exhibit IV-3.

Apparently, agencies intend to purchase vendor-taught classes more frequently than any other type of education or training service from vendors. Vendor classes taught on-site were rated most frequently for general ADP, office automation and image systems. Classes offered at vendor locations or learning centers were used more frequently for scientific and engineering information systems training.

The "old-fashioned" classroom style of instruction continues to appeal to government agencies. Classroom-style instruction allows the student to interact with the instructor in ways that cannot be anticipated by computer or video training programs.

EXHIBIT IV-3

Projected Acquisitions of
Vendor-Provided Education and Training
Services by IS Type

Services	Average Frequency Rating*			
	General	Specialized	OA	Image
CBT	2.8	2.4	2.6	2.2
CAI	3.0	1.6	2.3	2.0
Vendor classes taught on-site	3.8	2.7	2.9	3.4
Vendor classes taught at vendor site	2.8	3.2	2.0	2.2
Supplemental documentation	1.5	2.0	1.2	1.5
Vendor support staff on-site	2.0	2.2	1.3	2.0
Software tutorials	3.5	1.5	2.2	2.4

*1-5 scale; 5=extremely frequently 1=won't use at all

Note: ☐ =highest rating for each column

◯ =lowest rating for each column

Agencies intend to make limited use of supplemental documentation. Supplemental documentation that is not agency-specific or federalized with examples is difficult for agencies to cost-justify.

Even software tutorials did not receive popular ratings, except for use in general IS training. They are useful in teaching system basics, but fall short in teaching more technical functions or supporting agency-specific applications.

Agencies did not necessarily consider vendor-provided IS training superior to agency-provided training. In fact, the majority of respondents in INPUT's study indicated that the overall quality of agency-provided training is about the same as training given by vendors, as shown in Exhibit IV-4.

EXHIBIT IV-4

Agency Perceptions of Government versus Vendor-Provided IS Education and Training

Perception	Percent of Respondents	Reasons
Vendor quality better	27	• Profit motivated • Business function • Possess resources
Quality the same	64	• Content and instructors vary
Don't Know	9	N/A

Effective training is based on many factors: pupil ability, course content, instructor quality, and so on. These factors tend to vary each time courses are taught. Agencies continue to rely on contractors for education and training services, not because vendors do it better, but because agencies lack staff resources and, sometimes, the hardware resources to do the job cost-effectively. Also, it may not be cost-effective for agencies to develop in-house programs.

B

Technology Impact on Education and Training Requirements

Because increased computerization is affecting all aspects of American lives, INPUT expected the data to suggest that technology, particularly computer technology, was playing an instrumental role in fulfilling training requirements for government information systems. As noted earlier, respondents anticipate purchasing more teacher-taught classes than technological training tools. When asked specifically what "new or older technologies" respondents found most successful in training personnel for information systems operations and use, almost half of the responses referred to teaching methods, not technologies. The technologies that were mentioned are listed in Exhibit IV-5 in rank order.

EXHIBIT IV-5

Most Successful Technologies for Training Personnel in IS Use

Technology	Rank
Video training	1
Interactive display of monitor screens	2
Computer-based training (CBT)	3

Rank based on frequency of mention by respondents

Note: 44% of respondents referred to teaching methods, not technology

Linear video training was ranked first. It is the least expensive training method to use and the cost becomes less with greater use. The cost of one video training package is often the cost of a two-day class, approximately $1,000. This technology is more appropriate to less sophisticated users, and appeals to agencies that must train large numbers of users in basic computer and software skills.

Respondents mentioned the use of interactive displays of monitor screens in their classrooms as one of the more successful technologies available today. Vendors of this type of equipment should find a sizable market in the federal sector.

Computer-based training (CBT) was ranked third. This technology varies in complexity from simulating an actual information system environment to responding as an expert system.

Vendors desiring to increase market share in the education and training market must, in addition to providing traditional classroom training, also offer agencies training options such as video tapes and computer-based training. In some cases, these technologies serve to supplement traditional classroom training.

Other technologies, such as video conferencing, were not mentioned by respondents. However, some industry journals tout them as an example of a new innovative teaching technology that is cost-effective in reaching a maximum number of people. The Navy recently implemented videoconferencing in a pilot program called the Electronic Schoolhouse

Network, reaching five naval bases. Courses so far have been limited to management and ammunition administration topics. The Navy believes this leading-edge technology is very cost-effective and will most likely extend its application to information systems education. Vendors may soon be asked to respond to RFPs that specify videoconferencing training for information systems across multiple government sites.

C

Agency Dependence on Contractors

Three-quarters of the agencies surveyed believed their needs for vendor-provided education and training services for information systems should increase over the next five years, as shown in Exhibit IV-6. The average percent increase was forecasted at a healthy 72%. None predicted decreases, and one-fourth believed their requirements for these services would remain at current levels. Pent-up demand may partially account for the large percentage who expect an increase. One must remember, however, that respondents' forecasts are based on perceived needs, not on funding realities.

EXHIBIT IV-6

Agency Requirements for Vendor Services to Provide IS Education and Training FY 1990-FY 1995

Agency Requirements Direction	Percent of Respondents	Average Percent Change
Increase	78	72
Decrease	0	0
Remain the same	22	0

Increasing agency-specific requirements in this area, in addition to an overall general trend within the federal government for increased contractor-provided services, would seem to suggest viable and growing market opportunities for vendors. As depicted in Exhibit IV-7, agencies frequently cited the lack of in-house technical capabilities as their primary reason for seeking contractor assistance. Coupled with new technology advancements, agencies realize they need to depend on outside contractors to provide information systems training. Although IS training needs will increase, agency ability to fulfill these needs will be increasingly contrained.

EXHIBIT IV-7

Reasons for Increased Federal Dependence on Contractors for IS Education and Training

Reasons	Percent of Responses*
Lack of in-house technical expertise	75
Technology advances	50

Note: 91% of all respondents believed federal agencies overall were becoming increasingly dependent on contractors

*Will not add to 100%, multiple responses were allowed.

D

Procurement Methods

Respondents were asked to specify the percent of their information systems education and training services that were procured as standalone acquisitions versus services bundled into general systems acquisitions. Agency respondents were split evenly on the question, as indicated in Exhibit IV-8. Breaking down the data into range categories does not reveal any significant differences and confirms that the frequencies of standalone and bundled opportunities are similar. The results suggest that vendors need to pursue both approaches in order to penetrate the federal market.

EXHIBIT IV-8

Procurement Methods

Percent of Services	Percent of Standalone	Respondents* Bundled
75-100	50	38
50-74	13	13
25-49	0	13
0-24	38	38

Note: Average scores were 50% for both standalone and bundled acquisitions

*Columns do not add to 100% due to rounding

Types of standalone procurements vary somewhat from "bundled" procurements in which education and training services are acquired as part of a systems buy. Other forms of standalone technical information systems education purchases can include attending independently sponsored seminars and conferences, and the use of systems engineering and technical assistance contracting to provide services. The frequency ratings for each type of standalone service mentioned by respondents are shown in Exhibit IV-9.

On-site vendor-taught classes were the most frequently procured, with vendor classes offered at vendor locations listed second. Other forms of standalone services were not procured with great frequency, reinforcing the federal government's continued practice of using traditional teaching methods. As technology advances, agencies rely more intensely on contractors to provide training, but not on technology to provide the training.

EXHIBIT IV-9

Frequency Ratings for Standalone Procurements of Education and Training Vendor Services

Service/Procurement Vehicle	Average Frequency Rating*
Vendor classes taught on-site	3.9
Vendor classes taught at vendor site	2.8
Independently sponsored seminars/conferences	2.6
CBT courses for in-house training	2.6
Video tutorials	2.3
CAI courses for in-house training	1.8
Supplemental documentation	1.6
SETA contracts for training services	1.4

*Based on a 1-5 scale; 5=use extremely frequently, 1=not used at all

E

Other Factors Impacting the Market

In addition to agency tendencies to rely heavily on contractors to supply information systems education and training services, other factors also impact how and when agencies procure these services. Exhibit IV-10 lists factors that were mentioned most frequently by agency respondents.

As in other INPUT studies, agencies complained that the procurement regulations and the resulting lengthy procurement process they must follow severely impede the frequency of their procurements, and consequently how they are conducted. Freedom to choose contractors based on their reputations is of critical importance to some agencies, especially in selecting contractors for training services. However, the CICA severely limits when agencies can seek sole-source awards, and consequently can force agencies to conduct open competitions that result in more costly and lengthy procurements of services.

EXHIBIT IV-10

Other Factors that Impact Agency Use of Vendor-Provided Education and Training Services

Factors	Rank*
Procurement regulations	1
Budget cuts	2
CICA	3

*Rank based on frequency of mention

Budget cuts continue to plague agencies, and are not likely to abate over the next few years. One area that is often cut first is education and training of personnel. Faced with the responsibility of meeting increased workforce training requirements, and with continuing budget cuts, agencies will steer away from the preferred and costly classroom method of instruction. They increasingly will rely on reusable forms of training or incorporate IS training requirements into other contracts. Video and CBT training programs work especially well in developing basic computer and software skills. Once purchased, these products can be reused by numerous employees, thereby decreasing the cost of training per employee.

Agency requirements for training on more sophisticated systems will still persist. Personnel attrition and enhancements to existing systems, as well as acquisitions of more complicated technologies will force agencies to depend on outside contractors to train agency personnel technically. The proposed DoD Software Master Plan, when approved, should compel reeducation of existing personnel across the Defense Department and offer a host of new education and training opportunities for contractors.

Another factor that was assumed to impact agencies' acquisitions of training for information systems was the passing of the Federal Computer Security Act in 1987. The act, intended to strengthen computer security, mandated security training by requiring agencies to develop security plans for all information systems containing sensitive data.

Respondents were asked to rate the Act's impact on their acquisitions for training. Surprisingly, as shown in Exhibit IV-11, the average rating given was 2.5 on a 1-5 scale. The low rating and the reasons given by respondents suggest that the Act has had little impact, and has not fostered increased training services as expected. Many of the respondents in

tered increased training services as expected. Many of the respondents in the sample indicated that security matters were not a concern for their systems. Others indicated that the Act's intention is formally acknowledged within their agencies, but little practical attention had been paid to implementation, for various reasons. Lack of adequate planning and time, inadequate instructions and budget constraints were believed to be the chief reasons why agencies who should comply with the Act have not.

EXHIBIT IV-11

Impact of the Federal Computer Security Act on IS Training Requirements

Average Overall Rating*	Reasons
2.5	• Little impact • Adhered to in spirit • Implementation not viewed positively

*Based on a 1-5 scale; 5=extreme impact and 1=no impact
Impact could be positive or negative.

A recent GAO study concluded that most agency noncompliance was the result of top management failing to emphasize security programs within their agencies. Efforts to promote more compliance with the Computer Security Act have begun. OMB recently released a new bulletin (90-08) that revised agency guidelines, and set up technical advisory teams from NIST and NSA that will assist agency managers in developing and maintaining security plans. Guidance on computer security is also expected to be formalized as a Federal Information Processing Standard in the near future.
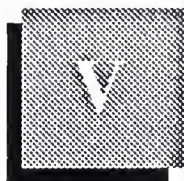
Key Opportunities

A

Education and Training Opportunities by Agency

This chapter describes specific opportunities in the federal market for IS education and training services. Although not all-inclusive, the opportunity list contains typical major programs that specify IS training as a component of the procurement. Opportunities are listed for the period FY 1991 to FY 1996. Other new programs have not yet been identified or initially approved by the responsible agency. Subsequent issues of INPUT's Procurement Analysis Reports will include new programs and detailed program information.

Agency/Program	PAR Reference	RFP Schedule	FY1991-FY1996 Funding (Est. $ Million)
Air Force			
System Engineer Support for NORAD Computer System	V-1-30	04/01/91	Unk
Standard Software Requirements Contracts I and II	V-1-121	01/01/91	Unk
Joint Staff Automation into the Nineties	V-1-126	11/15/90 (est)	Unk
Navy Superminicomputers	V-1-128	01/01/91	Unk
Database Machines	V-1-129	11/01/90	Unk
Scientific and Engineering Workstations	V-1-131	Unk	Unk
Management Information Systems Technical Support	V-1-139	11/01/90	Unk

Agency/Program	PAR Reference	RFP Schedule	FY1991-FY1996 Funding (Est. $ Million)
Army			
Installation Support Modules	V-2-45	Unk	Unk
Information Systems Software Center-Technical Support	V-2-54	01/01/95	Unk
Navy			
CAD/CAM II	V-3-14	Various	64,232
Relational Database Management System Software	V-3-100	12/01/90	Unk
Information Engineering II	V-3-104	Unk	Unk
Automated Billeting	V-3-106	Unk	Unk
Defense			
DoD CALS	V-4E-4	Various	Unk
Agriculture			
Geographic Information System - Project 615	VI-5-30	Unk	106,500
Integrated Systems Acquisition Project	VI-5-34	12/10/90	Unk
Laboratory Information Management System	VI-5-35	11-12/90	Unk
Energy			
ADP Support Services	VI-7-93	07/01/91	Unk
Health and Human Services			
HCFA Data Center	VII-8-42	FY93	Unk

Agency/Program	PAR Reference	RFP Schedule	FY1991-FY1996 Funding (Est. $ Million)
Interior			
Bureau of Land Management ADP Modernization Project	VII-9-11	Unk	128,900
Justice			
Computer-Assisted Dispatch and Reporting Enhancement II	VII-10-27	Unk	24,107
Transportation			
Instrument Approach Procedures Automation Project	VII-11-37	01/31/91	31,540
Treasury			
Document Processing System	VII-12-67	12/01/90	652,568
NASA			
White Sands Test Facility Support	VIII-15-95	10/10/93	Unk
Environmental Protection Agency			
Facilities Management Primary Support Contract for the NCC	VIII-17-7	11/15/90 (est)	Unk
Permit Compliance System Optical Character Reader	VIII-17-9	Unk	Unk
Environmental Monitoring and Assessment Program	VIII-17-13	10/01/91	Unk
Tennessee Valley Authority			
Personal Computer Hardware and Accessories Accelerated Delivery Schedule	VIII-25-3	11/15/90 (est)	Unk
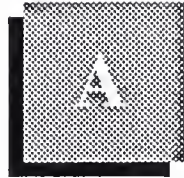
Appendix: Federal Education and Training Market Interview Profiles

A

Federal Agency Respondent Profile

The following federal agencies were interviewed by telephone for this issue paper:

- Air Force
- Agriculture
- Commerce
- Health and Human Services
- Justice
- Labor
- Navy

Multiple program managers and training directors were interviewed at the above agencies.

B

Vendor Respondent Profile

Vendors were not interviewed for this report.
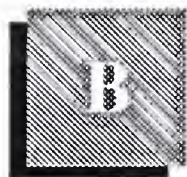
Appendix: Definitions

The definitions in this appendix include hardware, software, services, and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.

The federal government's unique nontechnical terminology that is associated with applications, documentation, budgets, authorization, and the procurement/acquisition process is included in Appendix C, Glossary of Acronyms.

A

Delivery Modes

Processing services - This category includes transaction processing, utility processing, other processing services, and processing facilities management.

- *Transaction Processing Services* - Updates client-owned data files by entry of specific business activity, such as sales order, inventory receipt, cash disbursement, etc. Transactions may be entered in one of three modes.

  - *Interactive* - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program files. Computer response is usually measured in seconds or fractions of a second.

  - *Remote Batch* - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

EXHIBIT B-1

Federal Information Systems and Services Program
Information Services Industry Structure
1990

Information Services Industry

Professional Services
- Consulting
- Education & Training
- Software Development
- Systems Operations (Client-Owned Equip.)

Systems Integration
- Equipment
- Packaged Software
- Custom Software
- Professional Svcs. (SI Related)

Software Products
- Applications Software
  - Workstation/PC
  - Midsize Computer
  - Mainframe
- Systems Software
  - Systems Control
    - Workstation/PC
    - Midsize Computer
    - Mainframe
  - Data Center Management
    - Workstation/PC
    - Midsize Computer
    - Mainframe
  - Applications Dev. Tools
    - Workstation/PC
    - Midsize Computer
    - Mainframe

Turnkey Systems
- Equipment
  - Workstation/PC
  - Midsize Computer
  - Mainframe
- Packaged Software
- Customized Software
- Support

Network Services
- Network Services
  - VANs
  - EDI
  - Electronic Mail
  - Other
- Electronic Info. Services
  - Data Bases
  - News
  - Videotex
  - Other

Processing Services
- Processing Services
  - Transaction Services
  - Utility Services
  - Other Services
- Systems Operations (Vendor-Owned Equip.)

Industry-Specific Sectors (15)

Cross-Industry Sectors (7)

- *User Site Hardware Services (USHS)* - Those offerings provided by processing services vendors that place programmable hardware at the user's site rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:

  * Access to a communications network

  * Access through the network to the RCS vendor's larger computers

  * Local management and storage of a data base subset that will service local terminal users via the connection of a data base processor to the network

  * Significant software as part of the service

- *Utility Processing* - Vendor provides access to basic software tools enabling the users to develop their own problem solutions such as language compilers assemblers, DBMS, sorts scientific library routines, and other systems software.

"Other" Processing Services include:

- *Batch Services* - These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing. Other services also includes disaster recovery and backup services.

- *Systems Operations (Processing)* - Also referred to as "Resource Management," Facilities Management or "COCO" (contractor-owned, contractor-operated). Systems control is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify, the contractor must directly plan, control, operate, and own the facility provided to the user—either on-site, through communications lines, or in a mixed mode.

Processing services are further differentiated as follows:

- *Cross-industry* services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category.

Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

- *Industry-specific* services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specific applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

Network Services include a wide variety of network-based functions and operations. The common thread is that more of these functions could be performed without network involvement. Network services is divided into two segments: value-added networks (enhanced services), and network applications (electronic information systems).

• *Value-Added Networks (VANs)* - VANs typically involve common carrier network transmission facilities that are augmented with computerized switches. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

• *Network applications* include electronic data interchange (EDI), the application-to-application electronic communications between organizations, based on established business document standards and electronic mail.

Software products - This category includes user purchases of applications and systems software packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, as indicated below and shown in detail in Exhibit B-2.

EXHIBIT B-2

Software Products

Systems Software

Systems Control

- Access Control
- Communications Monitors
- Encryption Systems
- Operating Systems
- Point-to-Point Control
- System Library Control
- Other

Data Center Management

- Capacity Management
- Computer Operations Scheduling
- Data Center Management
- Downtime/Repair Monitoring Management
- Job Accounting
- Performance Monitors
- Tape Management
- Utilities
- Other

Applications Development

Program Development and Production Tools

- Application Generators
- Assemblers
- Automatic Documentation
- Compilers
- Debugging Aids
- Languages
- Project Control and Management Systems
- Retrieval Systems
- Spreadsheet Systems
- Translators
- Others

Data Base Management Systems

- Data Base Management Systems
- Data Dictionaries
- Other

EXHIBIT B-2 (Cont.)

Software Products (cont.)

Applications Software

Cross-Industry

Accounting
- Accounts Payable
- Accounts Receivable
- Fixed Assets
- General Ledger
- Purchasing
- Other

Human Resources
- Benefits
- Payroll
- Personnel
- Training and Education
- Other

Information Analysis
- Budgeting
- Decision Support Systems
- Financial Planning
- Forecasting
- Modeling
- Other

Logistics Distribution
- Distribution Accounting
- Inventory
- Invoicing/Billing
- Mailing List
- Order Entry
- Procurement
- Other

Word Processing
- Document Generators
- Text Editors
- Word Processing
- Others

Graphics
- Character Graphics
- Line Graphics
- Picture Graphics
- Others

Other
- Administrative Services
- Executive Services
- Operations Services
- Project Control and Planning
- Scientific Engineering and Technical Support
- Other

Industry-Specific
- Education
- Federal Government
- Insurance
- Medical
- Process Manufacturing
- Services
- State and Local Government
- Transportation
- Utilities
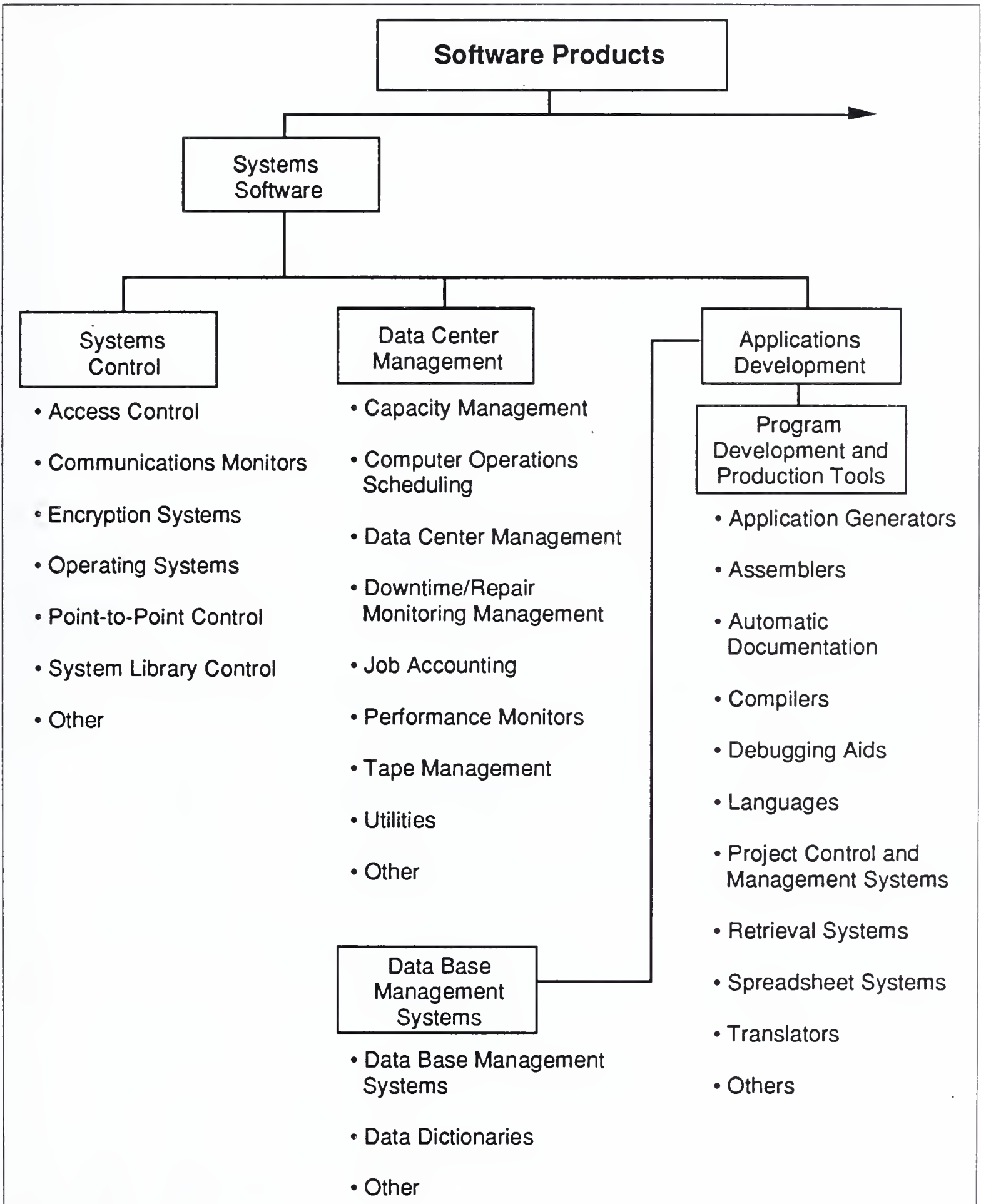- Other

- *Applications Products* - Software that performs functions directly related to solving user's business or organizational need. The products can be:

  - *Cross-Industry Products* - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.

  - *Industry-Specific Products* - Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.

- *Systems Software Products* - Software that enables the computer/ communications system to perform basic functions. These products include:

  - *System Control Products* - Function during applications program execution to manage the computer system resources. Examples include operating systems, communication monitors, emulators, spoolers, network control, library control, windowing, access control.

  - *Data Center Management Products* - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, utilities, capacity management.

  - *Applications Development Products* - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include traditional programming languages, 4GLs, sorts, productivity aids, assemblers, compilers, data dictionaries, data base management systems, report writers, project control, and CASE systems.

Professional Services - This category includes consulting, education and training, software development, and systems operations as defined below.

- *Software development* - Develops a software system on a custom basis. It includes one or more of the following: user requirements definition, system design, contract programming, documentation, and software maintenance.

- *Education and Training* - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.

- *Consulting Services* - Information systems and/or services management consulting, project assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- *Systems Operations (Professional Services)* - This is a counterpart to systems operations (processing services) except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single application (or set of applications) solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems may be either custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

- Turnkey systems revenue is divided into two categories:

  - *Industry-specific systems* - that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

  - *Cross-industry systems* - that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

- Revenue includes hardware, software, and support functions.

Systems Integration: (SI) delivery of large, complex multidisciplinary, multivendor systems, incorporating some or all of these categories: systems design, programming, integration, equipment, packaged software, communication networks, installation education and training, and SI-related professional services and acceptance. Systems integration contracts typically take more than a year to complete and involve a prime contractor assuming risk and accepting full responsibility.

B

Hardware/Hardware Systems

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* - Includes all input, output, communications, and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals.

- *Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.

- *Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters.

- *Communication Devices* - Includes modems, encryption equipment, special interfaces, and error control.

- *Storage Devices* - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

Terminals - Three types of terminals are described below:

- *User-Programmable* - Also called intelligent terminals, including:

  - Single-station or standalone
  - Multistation shared processor
  - Teleprinter
  - Remote batch

- *User Nonprogrammable*

  - Single-station
  - Multistation shared processor
  - Teleprinter

- *Limited Function* - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications.

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique

operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- *Microcomputer* - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in the form of:

  - Integrated circuit package

  - Plug-in boards with more memory and peripheral circuits

  - Console including keyboard and interfacing connectors

  - Personal computer with at least one external storage device directly addressable by the CPU

  - An embedded computer which may take a number of shapes or configurations

  Microcomputers are primarily single-user computers that cost under $15,000.

- *Midsize Computer* - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer. Specific systems in this category are: IBM 93XX systems, all Digital VAX series systems, and such common UNIX-based systems as from Apollo and Sun) are also included. Most large shared-logic, integrated office systems—such as those from Wang, Hewlett-Packard, and Groupe Bull—would also be considered midsize systems. Does not include microcomputers (standalone, or shared), embedded systems, and CAD/CAM systems.

- *Large Computer* - Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors or parallel processors. Intended for structured mathematical and signal processing and typically used with general-purpose, VonNeumann-type processors for system control. Usually refers to traditional mainframes (such as IBM 30XX, Unisys (Sperry) 1100/XX, Honeywell DDPS88, Unisys (Burroughs) A15, or CDC Cyber series) and supercomputers (such as products from Cray, ETA, Fujitsu, and the new IBM development effort).

- *Supercomputer* - High-powered processors with numerical processing throughput that is significantly greater than the fastest general-purpose computers, with capacities in the 100-500 million floating point opera-

tions per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class, are labeled Class IV to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

- *Real Time* - Generally used for signal processing in military applications.

- *Non-Real Time* - For scientific use in one of three configurations:

  * Parallel processors
  * Pipeline processor
  * Vector processor

- *Supercomputer* - Term applied to micro, mini, and large mainframe computers with performance substantially higher than attainable by VonNeuman architectures.

• *Embedded Computer* - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semi-permanent interfaces. May vary in capacity from microcomputers to parallel processors computer systems.

C

Telecommunications

Networks - Electronic interconnection between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.

• *Common Carrier Network* - A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud.

• *Value-Added Network (VAN)* - (See listing under Section B, Delivery Modes.)

• *Local-Area Network (LAN)* - Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods:

- *Baseband* - Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.

- *Broadband* - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:

  * Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing)

  * Multiple (time-sequenced) channels via TDM (Time Division Multiplexing)

  * High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media)

* *Wide-Area Network (WAN)* - Limited access network between computing resources in buildings, complexes of buildings, or buildings within a large metropolitan or wide geographical area. Uses baseband or broadband signaling methods.

Transmission Facilities - Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network.

* *Mode* - may be either:

  - *Analog* - Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems.

  - *Digital* - Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form.

* *Media* - May be any of the following:

  - *Wire* - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full-duplex balanced lines.

  - *Carrier* - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communi-

cations system, used in multiplexing applications to increase network capacity.

- *Coaxial Cable* - A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance.

- *Microwave* - UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.

- *Optical Fiber* - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications.

- *Communications Satellites* - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.

- *Cellular Radio* - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connections to the mobile unit from cell to cell.

D

General Definitions

103/113 - Bell standard modem for low-speed transmission up to 300 bps, asynchronous, half or full duplex.

212 - Bell standard for medium-speed transmission at 1200 bps, asynchronous or synchronous, half or full duplex.

ASCII - American National Standards Code for Information Interchange—eight-bit code with seven data bits and one parity bit.

Asynchronous - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished by appending signal elements to the data.

Bandwidth - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.

Baud - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.

Benchmark - Method of testing proposed ADP system solutions for a specified set of functions (applications) employing simulated or real data inputs under simulated operating conditions.

BPS - Bits per second - also mbps and kbps, million bits per second and thousand bits per second, respectively.

BSC - IBM's binary synchronous communications data link protocol. First introduced in 1968 for use on point-to-point and multipoint communications channels. Frequently referenced as "bisync."

Byte - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number).

CBX - Computerized Branch Exchange - a PABX based on a computer system, implying programmability and usually voice and data capabilities.

Central Processing Unit (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.

Centrex - Central office telephone services that permit local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.

Circuit Switching - A process that, usually on demand, connects two or more network stations and permits exclusive circuit use until the connection is released; typical of the voice telephone network where a circuit is established between the caller and the called party.

CO - Central Office - local telco site for one or more exchanges.

CODEC - Coder/decoder, equivalent to modem for digital devices.

Constant Dollars - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.

Computer System - The combination of computing resources required to perform the designed functions and which may include one or more CPUs, machine room peripherals, storage systems, and/or applications software.

CPE - Customer Premises Equipment - DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company CO. May include switchboards, PBX, data terminals, and telephone answering devices.

CSMA/CD - Carrier Sense Multiple Access/Collision Detect. Contention protocol used in local-area networks, typically with a multi-point configuration.

Current Dollars - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation.

Data Encryption Standard (DES) - 56-bit key, one-way encryption algorithm adopted by NBS in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.

Datagram - A self-contained packet of information with a finite length that does not depend on the contents of preceding or following packets.

DCA - IBM's Document Content Architecture - protocols for specifying document (text) format which are consistent across a variety of hardware and software systems within IBM's DISOSS.

DCE - Data Circuit-Terminating Equipment - interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain, and terminate a connection, including signal conversion and coding.

DDCMP - Digital Data Communications Message Protocol - data link protocol used in Digital Equipment Corporation's DECNET.

DECNET - Digital Equipment Corporation's network architecture.

Dedicated Circuit - A permanently established network connection between two or more stations; contrast with switched circuit.

DEMS - Digital Electronic Message Service - nationwide common carrier digital networks which provide high-speed, end-to-end, two-way transmission of digitally-encoded information using the 10.6 GHz band.

DIA - IBM's Document Interchange Architecture - protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS.

DISOSS - IBM's DIStributed Office Support System - office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision.

Distributed Data Processing - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's characteristics.

DTE - Data Terminal Equipment - hardware which is a data source or link or both, such as video display terminals that convert user information into data for transmission and reconvert data signals into user information.

EBCDIC - Extended Binary Coded Decimal Interchange Code - eight-bit code typically used in IBM mainframe environments.

EFT - Electronic funds transfer.

Encryption - Electrical, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points.

End User - One who is using a product or service to accomplish his or her own functions. The end user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing, and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs—they include parts and a bill of materials to effect the change in the hardware.

Equipment Operators - Individuals operating computer control consoles and/or peripheral equipment (BLS definition).

Ethernet - Local-area network developed by Xerox PARC using base-band signaling, CSMA/CD protocol, and coaxial cable to achieve a 10 mbps data rate.

Facsimile - Transmission and reception of data in graphic form, usually fixed images of documents, through scanning and conversion of a picture signal.

FDM - Frequency Division Multiplexing - a multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels.

FEP - Front-End Processor - communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers.

Field Engineer (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Full-Duplex - Bi-directional communications with simultaneous two-way transmission.

General-Purpose Computer System - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software, and small business systems.

Half-Duplex - Bi-directional communications, but only in one direction at a time.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.

HDLC - High-Level Data Link Control.

Hertz - Number of signal oscillations (cycles) per second - abbreviated Hz.

IBM Token Ring - IBM's local-area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies – IEEE 802.5-compatible.

IDN - Integrated Digital Network - digital switching and transmission; part of the evolution to ISDN.

Independent Suppliers - Suppliers of machine room peripherals - usually do not supply general purpose computer systems.

Information Processing - Data processing as a whole, including use of business and scientific computers.

Installed Base - Cumulative number or value (cost when new) of computers in use.

Interconnection - Physical linkage between devices on a network.

Interoperability - The capability to operate with other devices on a network. To be contrasted with interconnection, which merely guarantees a physical network interface.

ISDN - Integrated Services Digital Network - integrated voice and non-voice public network service which is completely digital. Not clearly defined through any existing standards although FCC and other federal agencies are participating in the development of CCITT recommendations.

Keypunch Operators - Individuals operating keypunch machines (similar in operation to electric typewriters) to transcribe data from source materials onto punch cards.

Lease Line - Permanent connection between two network stations. Also known as dedicated or non-switched line.

Machine Repairers - Individuals who install and periodically service computer systems.

Machine Room Peripherals - Peripheral equipment that is generally located close to the central processing unit.

Mainframe - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more. Usually refers to traditional mainframes (such as IBM 30XX, Unisys (Sperry) 1100/XX, Honeywell DDPS88, Unisys (Burroughs) A15, or CDC (Cyber series).

MAP - Manufacturing Automation Protocol - seven-layer communications standard for factory environments promoted by General Motors/ EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.

Mean Time to Repair - The mean of elapsed times from the arrival of the field engineer on the user's site until the device is repaired and returned to user service.

Mean Time to Respond - The mean of elapsed times from the user call for services and the arrival of the field engineer on the user's site.

Message - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.

MMFS - Manufacturing Messaging Format Standard - application-level protocol included within MAP.

Modem - A device that encodes information into electronically transmittable form (MOdulator) and restores it to original analog form (DEModulator).

NCP - Network Control Program - software used in IBM 3705/3725 FEPs for control of SNA networks.

Node - Connection point of three or more independent transmission points which may provide switching or data collection.

Off-Line - Pertaining to equipment or devices that can function without direct control of the central processing unit.

On-Line - Pertaining to equipment or devices under direct control of the central processing unit.

OSI - ISO reference model for Open Systems Interconnection - seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment.

OSI Application Layer - Layer 7, providing end-user applications services for data processing.

OSI Data Link Layer - Layer 2, providing transmission protocols, including frame management, link flow control, and link initiation/release.

OSI Network Layer - Layer 3, providing call establishment and clearing control through the network nodes.

OSI Physical Layer - Layer 1, providing the mechanical, electrical, functional, and procedural characteristics to establish, maintain, and release physical connections to the network.

OSI Presentation Layer - Layer 6, providing data formats and information such as data translation, data encoding/decoding, and command translation.

OSI Session Layer - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes.

OSI Transport Layer - Layer 4, providing end-to-end terminal control signals such as acknowledgements.

Overseas - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions.

PABX - Private Automated Branch Exchange - hardware that provides automatic (electromechanical or electronic) local circuit switching on a customer's premises.

PAD - Packet Assembler-Disassembler - a device that enables DTE not equipped for packet switching operation to operate on a packet-switched network.

PBX - Private Branch Exchange - hardware which provides local circuit switching on the customer premise.

PCM - Pulse-Code Modulation - modulation involving conversion of a waveform from analog to digital form through coding.

PDN - Public Data Network - a network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public.

Peripherals - Any unit of input/output equipment in a computer system, exclusive of the central processing unit.

PPM - Pulse Position Modulation.

Private Network - A network established and operated for one user or user organization.

Programmers - Persons mainly involved in designing, writing, and testing of computer software programs.

Protocols - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.

Public Network - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related international definition of PDN.

Scientific Computer System - A computer system designed to process structured mathematics, such as Fast Fourier Transforms, and complex, highly redundant information, such as seismic data, sonar data, and radar, with large on-line memories and very high capacity throughput.

SDLC - Synchronous Data Link Control - IBM's data link control for SNA. Supports a subset of HDLC modes.

SDN - Software-Defined Network.

Security - Physical, electrical, and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations.

Service Delivery Point - The location of the physical interface between a network and customer/user equipment.

Simplex - Undirectional communications.

Smart Box - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol convertors, for example.

SNA - Systems Network Architecture-seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.

Software - Computer programs.

Supplies - Includes materials associated with the use or operations of computer systems, such as printer paper, keypunch cards, disk packs, and tapes.

Switched Circuit - Temporary connection between two network stations established through dial-up procedures.

Synchronous - Communications operation with separate, continuous clocking at both sending and receiving stations.

Systems Analyst - Individual who analyzes problems to be converted to a programmable form for application to computer systems.

Systems House - Vendor that acquires, assembles, and integrates hardware and software into a total system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.

Systems Integrator - Systems house vendor that develops systems interface electronics, applications software, and controllers for the CPU, peripherals, and ancillary subsystems that may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.

TI - Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels.

TDM - Time Division Multiplexing - a multiplexing method that interweaves multiple transmissions on a single circuit by assigning a different time slot to each channel.

Token Passing - Local area network protocol which allows a station to transmit only when it has the "token," an empty slot on the carrier.

TOP - Technical Office Protocol - protocol developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP.

Turnkey System - System composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

Twisted-Pair Cable - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs.

Verification and Validation - Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user.

Voice-Grade - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system - nominally a 4 KHz user.

VTAM - Virtual Telecommunications Access Method - host-resident communications software for SNA networks.

E

Other Considerations

When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures then are categorized according to what the users perceive they are buying.
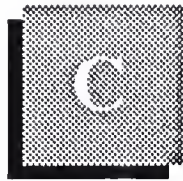
Appendix: Glossary of Acronyms

The federal government's procurement language uses a combination of acronyms, phrases, and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering, and law with new applications and technology.

Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are included here, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency acronyms have been included to the extent they are employed in this report.

A

Federal Acronyms

AAS	Automatic Addressing System.
AATMS	Advanced Air Traffic Management System.
ACO	Administrative Contracting Offices (DCAS).
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHz Satellite Program).
ACT-1	Advanced Computer Techniques (Air Force).
Ada	DoD High-Order Language.
ADA	Airborne Data Acquisition.
ADL	Authorized Data List.
ADS	Automatic Digital Switches (DCS).
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association.
AGE	Aerospace Ground Equipment.
AIP	Array Information Processing.

AIS	Automated Information System.
AMPE	Automated Message Processing Equipment.
AMPS	Automated Message Processing System.
AMSL	Acquisition Management Systems List.
ANG	Army National Guard
AP(P)	Advance Procurement Plan.
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch.
APR	Agency Procurement Request.
ARPANET	DARPA network of scientific computers.
ASP	Aggregated Switch Procurement.
ATLAS	Abbreviated Test Language for All Systems (for ATE-Automated Test Equipment).
Authorization	In the legislative process programs, staffing, and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army.
AUTODIN	AUTOmatic DIgital Network of the Defense Communications System.
AUTOSEVOCOM	AUTOmatic SEcure VOice COMmunications Network.
AUTOVON	AUTOmatic VOice Network of the Defense Communications System.
BA	Basic Agreement.
BAFO	Best And Final Offer.
Base level	Procurement, purchasing, and contracting at the military installation level.
BCA	Board of Contract Appeals.
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements.
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
BML	Bidders Mailing List - qualified vendor information filed annually with federal agencies to automatically receive RFPs and RFQs in areas of claimed competence.
BOA	Basic Ordering Agreement.
B&P	Bid and Proposal - vendor activities in response to government solicitation/specific overhead allowance.
BPA	Blanked Purchase Agreement.
Budget	Federal Budget, proposed by the President and subject to Congressional review.
C^2	Command and Control.
C^3	Command, Control, and Communications.
C^4	Command, Control, Communications, and Computers.
C^3I	Command, Control, Communications, and Intelligence.
CAB	Contract Adjustment Board or Contract Appeals Board.
CADE	Computer-Aided Design and Engineering.
CADS	Computer-Assisted Display Systems.
CAIS	Computer-Assisted Instruction System.
CALS	Computer-Aided Automated Logistic System.
CAPS	Command Automation Procurement Systems.

CAS	Contract Administration Services or Cost Accounting Standards.
CASB	Cost Accounting Standards Board.
CASP	Computer-Assisted Search Planning.
CBD	*Commerce Business Daily* - U.S. Department of Commerce publication listing government contract opportunities and awards.
CBO	Congressional Budget Office.
CCEP	Commercial Comsec Endorsement Program.
CCDR	Contractor Cost Data Reporting.
CCN	Contract Change Notice.
CCPDS	Command Center Processing and Display Systems.
CCPO	Central Civilian Personnel Office.
CCTC	Command and Control Technical Center (JCS).
CDR	Critical Design Review.
CDRL	Contractor Data Requirement List.
CFE	Contractor-Furnished Equipment.
CFR	Code of Federal Regulations.
CICA	Competition in Contracting Act.
CIG	Computerized Interactive Graphics.
CIR	Cost Information Reports.
CM	Configuration Management.
CMI	Computer-Managed Instruction.
CNI	Communications, Navigation, and Identification.
CO	Contracting Office, Contract Offices, or Change Order.
COC	Certificate of Competency (administered by the Small Business Administration).
COCO	Contractor-Owned, Contractor-Operated.
CODSIA	Council of Defense and Space Industry Associations.
COMSTAT	Communications Satellite Corporation.
CONUS	CONtinental United States.
COP	Capability Objective Package.
COTR	Contracting Officer's Technical Representative.
CP	Communications Processor.
CPAF	Cost-Plus-Award-Fee Contract.
CPFF	Cost-Plus-Fixed-Fee Contract.
CPIF	Cost-Plus-Incentive-Fee Contract.
CPR	Cost Performance Reports.
CPSR	Contractor Procurement System Review.
CR	Cost Reimbursement (Cost Plus Contract).
CSA	Combat or Computer Systems Architecture.
C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec").
CWAS	Contractor Weighted Average Share in Cost Risk.
DAL	Data Accession List.
DAR	Defense Acquisition Regulations.
DARPA	Defense Advanced Research Projects Agency.
DAS	Data Acquisition System.
DBHS	Data Base Handling System.
DCA	Defense Communications Agency.

DCAA	Defense Contract Audit Agency.
DCAS	Defense Contract Administration Services.
DCASR	DCAS Region.
DCC	Digital Control Computer.
DCP	Development Concept Paper (DoD).
DCS	Defense Communications System.
DCTN	Defense Commercial Telecommunications Network.
DDA	Dynamic Demand Assessment (Delta Modulation).
DDC	Defense Documentation Center.
DDL	Digital Data Link - A segment of a communications network used for data transmission in digital form.
DDN	Defense Data Network.
DDS	Dynamic Diagnostics System.
DECCO	DEfense Commercial Communications Office.
DECEO	DEfense Communications Engineering Office.
D&F	Determination and Findings - required documentation for approval of a negotiated procurement.
DIA	Defense Intelligence Agency.
DIF	Document Interchange Format, Navy-sponsored word processing standard.
DHHS	Department of Health and Human Services.
DIDS	Defense Integrated Data Systems.
DISC	Defense Industrial Supply Center.
DLA	Defense Logistics Agency.
DMA	Defense Mapping Agency.
DNA	Defense Nuclear Agency.
DO	Delivery Order.
DOA	Department of Agriculture (also USDA).
DOC	Department of Commerce.
DOE	Department of Energy.
DOI	Department of Interior.
DOJ	Department of Justice.
DOS	Department of State.
DOT	Department of Transportation.
DPA	Delegation of Procurement Authority (granted by GSA under FPRs).
DPC	Defense Procurement Circular.
DQ	Definite Quantity Contract.
DQ/PL	Definite Quantity Price List Contract.
DR	Deficiency Report.
DSCS	Defense Satellite Communication System.
DSN	Defense Switched Network.
DSP	Defense Support Program (WWMCCS).
DSS	Defense Supply Service.
DTC	Design-To-Cost.
ECP	Engineering Change Proposal.
ED	Department of Education.
EEO	Equal Employment Opportunity.
8(a) Set-Aside	Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.

EMC	Electro-Magnetic Compatibility.
EMCS	Energy Monitoring and Control System.
EO	Executive Order - Order issued by the President.
EOQ	Economic Ordering Quantity.
EPA	Economic Price Adjustment.
EPA	Environmental Protection Agency.
EPMR	Estimated Peak Monthly Requirement.
EPS	Emergency Procurement Service (GSA) or Emergency Power System.
EUC	End User Computing, especially in DoD.
FA	Formal Advertising.
FAC	Facility Contract.
FAR	Federal Acquisition Regulations.
FCA	Functional Configuration Audit.
FCC	Federal Communications Commission.
FCDC	Federal Contract Data Center.
FCRC	Federal Contract Research Center.
FDPC	Federal Data Processing Center.
FEDSIM	Federal (Computer) Simulation Center (GSA).
FEMA	Federal Emergency Management Agency.
FFP	Firm Fixed-Price Contract (also Lump Sum Contract).
FIPS	NBS Federal Information Processing Standard.
FIPS PUBS	FIPS Publications.
FIRMR	Federal Information Resource Management Regulations.
FMS	Foreign Military Sales.
FOC	Final Operating Capability.
FOIA	Freedom of Information Act.
FP	Fixed-Price Contract.
FP-L/H	Fixed-Price - Labor/Hour Contract.
FP-LOE	Fixed-Price - Level-Of-Effort Contract.
FPMR	Federal Property Management Regulations.
FPR	Federal Procurement Regulations.
FSC	Federal Supply Classification.
FSG	Federal Supply Group.
FSN	Federal Supply Number.
FSS	Federal Supply Schedule or Federal Supply Service (GSA).
FSTS	Federal Secure Telecommunications System.
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.
FTSP	Federal Telecommunications Standards Program administered by NCS; Standards are published by GSA.
FTS	Federal Telecommunications System.
FTS 2000	Proposed replacement for the Federal Telecommunications System.
FY	Fiscal Year.
FYDP	Five-Year Defense Plan.
GAO	General Accounting Office.
GFE	Government-Furnished Equipment.

GFM	Government-Furnished Material.
GFY	Government Fiscal Year (October to September).
GIDEP	Government-Industry Data Exchange Program.
GOCO	Government-Owned, Contractor-Operated.
GOGO	Government-Owned, Government-Operated.
GOSIP	Government Open Systems Interconnection Profile.
GPO	Government Printing Office.
GPS	Global Positioning System.
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control.
GS	General Schedule.
GSA	General Services Administration.
GSBCA	General Services Administration Board of Contract Appeals.
HCFA	Health Care Financing Administration.
HHS	(Department of) Health and Human Services.
HPA	Head of Procuring Activity.
HSDP	High-Speed Data Processors.
HUD	(Department of) Housing and Urban Development.
ICA	Independent Cost Analysis.
ICAM	Integrated Computer-Aided Manufacturing.
ICE	Independent Cost Estimate.
ICP	Inventory Control Point.
ICST	Institute for Computer Sciences and Technology, National Bureau of Standards, Department of Commerce.
IDAMS	Image Display And Manipulation System.
IDEP	Interservice Data Exchange Program.
IDN	Integrated Data Network.
IFB	Invitation For Bids.
IOC	Initial Operating Capability.
IOI	Internal Operating Instructions.
IPS	Integrated Procurement System.
IQ	Indefinite Quantity Contract.
IR&D	Independent Research & Development.
IRM	Information Resources Management.
IXS	Information Exchange System.
JFMIP	Joint Financial Management Improvement Program.
JOCIT	Jovial Compiler Implementation Tool.
JSIPS	Joint Systems Integration Planning Staff.
JSOP	Joint Strategic Objectives Plan.
JSOR	Joint Service Operational Requirement.
JUMPS	Joint Uniform Military Pay System.
LC	Letter Contract.
LCC	Life Cycle Costing.
LCMP	Life Cycle Management Procedures (DD7920.1).

|	
LCMS	Life Cycle Management System.
L-H	Labor-Hour Contract.
LOI	Letter of Interest.
LRPE	Long-Range Procurement Estimate.
LRIRP	Long-Range Information Resource Plan.
MAISRC	Major Automated Information Systems Review Council (DoD).
MANTECH	MANufacturing TECHnology.
MAPS	Multiple Address Processing System.
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol.
MASC	Multiple Award Schedule Contract.
MDA	Multiplexed Data Accumulator.
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition).
MILSCAP	Military Standard Contract Administration Procedures.
MIL SPEC	Military Specification.
MIL STD	Military Standard.
MIPR	Military Interdepartmental Purchase Request.
MOD	Modification.
MOL	Maximum Ordering Limit (Federal Supply Service).
MPC	Military Procurement Code.
MYP	Multi-Year Procurement.
NARDIC	Navy Research and Development Information Center.
NASA	National Aeronautics and Space Administration.
NBS	National Bureau of Standards.
NCMA	National Contract Management Association.
NCS	National Communications System; responsible for setting U.S. Government standards administered by GSA; also holds primary responsibility for emergency communications planning.
NICRAD	Navy-Industry Cooperative Research and Development.
NIP	Notice of Intent to Purchase.
NMCS	National Military Command System.
NSA	National Security Agency.
NSEP	National Security and Emergency Preparedness.
NSF	National Science Foundation.
NSIA	National Security Industrial Association.
NTIA	National Telecommunications and Information Administration of the Department of Commerce; replaced the Office of Telecommunications Policy in 1970 as planner and coordinator for government communications programs; primarily responsible for radio.
NTIS	National Technical Information Service.
Obligation	"Earmarking" of specific funding for a contract from committed agency funds.
OCS	Office of Contract Settlement.
OFCC	Office of Federal Contract Compliance.
Off-Site	Services to be provided near but not in government facilities.
OFMP	Office of Federal Management Policy (GSA).

OFPP	Office of Federal Procurement Policy.
OIRM	Office of Information Resources Management.
O&M	Operations & Maintenance.
OMB	Office of Management and Budget.
O,M&R	Operations, Maintenance, and Readiness.
On-Site	Services to be performed on a government installation or in a specified building.
OPM	Office of Procurement Management (GSA) or Office of Personnel Management.
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion.
OSHA	Occupational Safety and Health Act.
OSI	Open System Interconnect.
OSP	Offshore Procurement.
OTA	Office of Technology Assessment (Congress).
Out-Year	Proposed funding for fiscal years beyond the Budget Year (next fiscal year).
P-I	FY Defense Production Budget.
P3I	Pre-Planned Product Improvement (program in DoD).
PAR	Procurement Authorization Request or Procurement Action Report.
PAS	Pre-Award Survey.
PASS	Procurement Automated Source System.
PCO	Procurement Contracting Officer.
PDA	Principal Development Agency.
PDM	Program Decision Memorandum.
PDR	Preliminary Design Review.
PIR	Procurement Information Reporting.
PME	Performance Monitoring Equipment.
PMP	Purchase Management Plan.
PO	Purchase Order or Program Office.
POM	Program Objective Memorandum.
POSIX	Portable Open System Interconnection Exchange.
POTS	Purchase of Telephone Systems.
PPBS	Planning, Programming, Budgeting System.
PR	Purchase Request or Procurement Requisition.
PRA	Paperwork Reduction Act.
PS	Performance Specification - alternative to a Statement of Work, when work to be performed can be clearly specified.
QA	Quality Assurance.
QAO	Quality Assurance Office.
QMCS	Quality Monitoring and Control System (DoD software).
QMR	Qualitative Material Requirement (Army).
QPL	Qualified Products List.
QRC	Quick Reaction Capability.
QRI	Quick Reaction Inquiry.
R-I	FY Defense RDT&E Budget.
RAM	Reliability, Availability, and Maintainability.
RC	Requirements Contract.

R&D	Research and Development.
RDA	Research, Development, and Acquisition.
RDD	Required Delivery Date.
RD&E	Research, Development, and Engineering.
RDF	Rapid Deployment Force.
RDT&E	Research, Development, Test, and Engineering.
RFI	Request For Information.
RFP	Request For Proposal.
RFQ	Request For Quotation.
RFTP	Request For Technical Proposals (Two-Step).
ROC	Required Operational Capability.
ROI	Return On Investment.
RTAS	Real Time Analysis System.
RTDS	Real Time Display System.
SA	Supplemental Agreement.
SBA	Small Business Administration.
SB Set-Aside	Small Business Set-Aside contract opportunities with bidders limited to certified small businesses.
SCA	Service Contract Act (1964 as amended).
SCN	Specification Change Notice.
SDN	Secure Data Network.
SEC	Securities and Exchange Commission.
SE&I	Systems Engineering and Integration.
SETA	Systems Engineering/Technical Assistance.
SETS	Systems Engineering/Technical Support.
SIBAC	Simplified Intragovernmental Billing and Collection System.
SIMP	Systems Integration Master Plan.
SIOP	Single Integrated Operations Plan.
SNAP	Shipboard Nontactical ADP Program.
Sole Source	Contract award without competition.
Solicitation	Invitation to submit a bid.
SOR	Specific Operational Requirement.
SOW	Statement of Work.
SSA	Source Selection Authority (DoD).
SSAC	Source Selection Advisory Council.
SSEB	Source Selection Evaluation Board.
SSO	Source Selection Official (NASA).
STINFO	Scientific and Technical INFOrmation Program - Air Force/NASA.
STU	Secure Telephone Unit.
SWO	Stop-Work Order.
Synopsis	Brief Description of contract opportunity in CBD after D&F and before release of solicitation.
TA/AS	Technical Assistance/Analysis Services.
TCP/IP	Transmission Control Protocol/Internet Protocol.

TEMPEST	Studies, inspections, and tests of unintentional electromagnetic radiation from computer, communication, command, and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs.
TILO	Technical and Industrial Liason Office—Qualified Requirement Information Program - Army.
TM	Time and Materials contract.
TOA	Total Obligational Authority (Defense).
TOD	Technical Objective Document.
TR	Temporary Regulation (added to FPR, FAR).
TRACE	Total Risk Assessing Cost Estimate.
TRCO	Technical Representative of the Contracting Offices.
TREAS	Department of Treasury.
TRP	Technical Resources Plan.
TSP	GSA's Teleprocessing Services Program.
TVA	Tennessee Valley Authority.
UCAS	Uniform Cost Accounting System.
USA	U.S. Army.
USAF	U.S. Air Force.
USCG	U.S. Coast Guard.
USMC	U.S. Marine Corps.
USN	U.S. Navy.
U.S.C.	United States Code.
USPS	United States Postal Service.
USRRB	United States Railroad Retirement Board.
VA	Veterans Affairs Department.
VE	Value Engineering.
VHSIC	Very High Speed Integrated Circuits.
VIABLE	Vertical Installation Automation BaseLine (Army).
VICI	Voice Input Code Identifier.
WBS	Work Breakdown Structure.
WGM	Weighted Guidelines Method.
WIN	WWMCCS Intercomputer Network.
WITS	Washington Interagency Telecommunications System.
WIS	WWMCCS Information Systems.
WS	Work Statement - Offerer's description of the work to be done (proposal or contract).
WWMCCS	World-Wide Military Command and Control System.

B

General and Industry Acronyms

ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association.
ADP	Automatic Data Processing.
ADPE	Automatic Data Processing Equipment.
ANSI	American National Standards Institute.
BOC	Bell Operating Company.
CAD	Computer-Aided Design.
CAM	Computer-Aided Manufacturing.
CBEMA	Computer and Business Equipment Manufacturers Association.
CCIA	Computers and Communications Industry Association.
CCITT	Comite Consultatif Internationale de Telegraphique et Telephonique; Committee of the International Telecommunication Union.
COBOL	COmmon Business-Oriented Language.
COS	Corporation for Open Systems.
CPU	Central Processing Unit.
DBMS	Data Base Management System.
DRAM	Dynamic Random Access Memory.
EIA	Electronic Industries Association.
EPROM	Erasable Programmable Read-Only-Memory.
IEEE	Institute of Electrical and Electronics Engineers.
ISDN	Integrated Services Digital Networks.
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT.
ITU	International Telecommunication Union.
LSI	Large-Scale Integration.
MFJ	Modified Final Judgement.
PROM	Programmable Read-Only Memory.
RBOC	Regional Bell Operating Company.
UNIX	AT&T Proprietary Operating System.
UPS	Uninterruptable Power Source.
VAR	Value-Added Retailer.
VLSI	Very Large-Scale Integration.
WORM	Write-Once-Read-Many-Times.
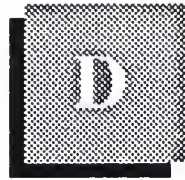
Appendix: Policies, Regulations, and Standards

A
OMB Circulars

A-11	Preparation and Submission of Budget Estimates.
A-49	Use of Management and Operating Contracts.
A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities.
A-76	Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government.
A-109	Major Systems Acquisitions.
A-120	Guidelines for the Use of Consulting Services.
A-121	Cost Accounting, Cost Recovery, and Integrated Sharing of DataProcessing Facilities.
A-123	Internal Control Systems.
A-127	Financial Management Systems.
A-130	Management of Federal Information Resources.
A-131	Value Engineering.

B
GSA Publications

The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition, and use of both ADP and telecommunications information resources.

C
DoD Directives

DD-5000.1	Major System Acquisitions.
DD-5000.2	Major System Acquisition Process.
DD-5000.11	DoD Data Elements and Data Codes Standardization Program.
DD-5000.31	Interim List of DoD-Approved High-Order Languages.
DD-5000.35	Defense Acquisition Regulatory Systems.
DD-5200.1	DoD Information Security Program.
DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems.

	DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing, and Evaluating Secure Resource Sharing ADP Systems.
	DD-7920.1	Life Cycle Management of Automated Information (AIS).
	DD-7920.2	Major Automated Information Systems Approval Process.
	DD-7935	Automated Data Systems (ADS) Documentation.

D

Standards	ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NBS FIPS 71.
	CCITT G.711	International PCM standard.
	CCITT T.0	International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.
	DEA-1	Proposed ISO standard for data encryption based on the NBS DES.
	EIA RS-170	Monochrome video standard.
	EIA RS-170A	Color video standard.
	EIA RS-464	EIA PBX standards.
	EIA RS-465	Standard for Group III facsimile.
	EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network.
	EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24.
	EIA RS-449	New EIA standard DTE to DCE interface which replaces RS-232-C.
	FED-STD 1000	Proposed Federal Standard for adoption of the full OSI reference model.
	FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
	FED-STD 1041	Equivalent to FIPS 100.
	FED-STD 1061	Group II Facsimile Standard (1981).
	FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465.
	FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466.
	FED- STDs 1005, 1005A-1008	Federal Standards for DCE Coding and Modulation.
	FIPS 46	NBS Data Encryption Standard (DES).
	FIPS 81	DES Modes of Operation.
	FIPS 100	NBS Standard for packet-switched networks; subset of 1980 CCITT X.25.
	FIPS 107	NBS Standard for local area networks, similar to IEEE 802.2 and 802.3.

FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP).
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard.
IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local area networks.
IEEE 802.3	Local-area network standard similar to Ethernet.
IEEE 802.4	OSI-compatible standard for token-bus local area networks.
IEEE 802.5	Local-area networks standard for token-ring networks.
IEEE P1003.1	POSIX standard, similar to FIPS 151.
MIL-STD-188-114C	Physical interface protocol similar to RS-232 and RS-449.
MIL-STD-1777	IP-Internet Protocol.
MIL-STD-1778	TCP - Transmission Control Protocol.
MIL-STD-1780	File Transfer Protocol.
MIL-STD-1781	Simple Mail Transfer Protocol (electronic mail).
MIL-STD-1782	TELNET - virtual terminal protocol.
MIL-STD-1815A	Ada Programming Language Standard.
SVID	UNIX System Interface Definition.
X.12	ANSI standard for Electronic Data Interchange.
X.21	CCITT Standard for interface between DTE and DCE for synchronous operation on public data networks.
X.25	CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
X.75	CCITT standard for links that interface different packet networks.
X.400	ISO Application-level standard for the electronic transfer of messages (electronic mail).
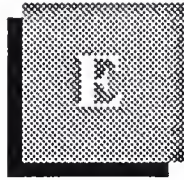
Appendix: Related INPUT Reports

A

Annual Market
Analyses

Procurement Analysis Reports, FY1990-1995

B

Market Reports

Federal Professional Services Market, 1989-1994

Federal Software and Related Services Market, 1989-1994

Federal Systems Integration Market, 1989-1994

Federal Microcomputer Market, 1989-1994

Defense Logistics Agency Information Services Market

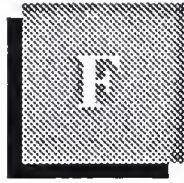*Federal Processing Services and Operations Support Market, 1989-1994*

Federal Electronic Data Interchange Market, 1989-1994

Federal Financial Systems Market, 1990-1995

Federal Equipment Maintenance Market, 1990-1995

Federal Computer Security Market, 1990-1995

Federal Telecommunications Market, 1990-1995

Appendix: Agency Interview Questionnaire

The following questionnaire was used to interview agency personnel to ascertain current and future agency IS training practices:

INPUT Confidential

Federal Education and Training Market
FY1990-FY1995
Agency Questionnaire

1a.   Does your organization/agency use contractors to provide education and training services for information technology systems? (check one)

Yes   _____ (Go to Q2)
No   _____

1b.   How is education and training for information systems operations and use accomplished within your organization/agency?

_____

_____

_____

End Interview

2.   What percent of your organization's/agency's information systems require vendor-provided education and training?

     Percent: _____

3.   What percent of your education and training services are for initial contractor services only (installation, and training required to make the system functional) versus continuing (ongoing) services from a vendor?

              Percent

     Initial   _____
     Ongoing   _____

4.   What percent of all information systems education and training services are procured as standalone procurements versus those incorporated into general systems acquisitions contracts (bundled procurements)?

              Percent

     Standalone   _____
     Bundled   _____

5.   For information system procurements that include education and training services from the contractor, what percent have the education and training portions subcontracted to another vendor?

     Percent: _____

6. For standalone procurements of education and training services, please rate on a
    1-5 scale (5 = extremely frequently; and 1 = not used at all), how frequently your
    organization uses each of the following types of vendor-provided services:

    Services   Circle One

    SETA task order contracts   1   2   3   4   5

    Attend independently sponsored   1   2   3   4   5
    technology seminars/conferences

    Attend vendor product classes   1   2   3   4   5
    at vendor locations

    Procure vendor-taught classes   1   2   3   4   5
    for agency locations

    Purchase CBT courses for in-house   1   2   3   4   5
    training

    Purchase CAI courses for in-house   1   2   3   4   5
    training

    Documentation   1   2   3   4   5

    Other (specify): _____   1   2   3   4   5

7. I'm going to read you a list of various types of education and training services
    that vendors offer. This time I'd like you to rate how frequently you think your
    organization will be procuring these services during the next five years for four
    categories of information systems: general ADP systems, specialized (scientific
    and engineering), office automation, and image processing systems.

Services	General	Specialized (enter 1-5 rating for each)	OA	Image
CBT	_____	_____	_____	_____
CAI	_____	_____	_____	_____
Vendor-taught on-site	_____	_____	_____	_____
Classes at vendor site	_____	_____	_____	_____
Documentation	_____	_____	_____	_____
Maintain vendor support staff on-site	_____	_____	_____	_____
Software tutorials	_____	_____	_____	_____
Other (specify):	_____	_____	_____	_____

8. What new or older technologies does your organization find extremely successful in training personnel for information systems operations and use?

_____

_____

_____

9. In your opinion, will your organization's requirements for vendor-provided information systems education and training services increase, decrease, or remain the same over the next five years? Can you estimate the percent change?

	Check One	Indicate Percent Change
Increase	_____	_____
Decrease	_____	_____
Remain the same	_____	_____
Don't know	_____	_____

10a. Overall do you think there is a trend in federal agencies toward increased use or dependence on contractors to provide education and training services for information systems? (check one)

Yes   _____
No   _____

10b. Why? _____

_____

_____

11a. If you were to compare the quality and effectiveness of government-provided training with vendor-provided training generally, would you say . . .

	Check One
Government training is better	_____
Vendor training is better	_____
Both are about the same	_____
Don't know	_____ (Go to Q12A)

11b. Why?_____

_____

_____

12a. Using that 1-5 scale again, rate the impact the Federal Computer Security Act
has had on your organization's information systems training requirements or
procurements (5 = extreme impact, 1 = no impact).

Circle One   1   2   3   4   5

12b. Please explain:. _____

_____

_____

13. Are there any other regulations, policies, or laws that impact your organization's
use of vendor-provided education and training services for information systems?
(please clarify any responses)

_____

_____

_____

14. In what ways should vendors of education and training services change their
products or services to better support federal needs?

_____

_____

_____